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CONTENTS

	PAGE
Editorials	913
Letters to the Editor	918
Publications Received	919
The Scrap Heap	920
Overseas Railway Affairs	921
Notes on a Unified Colonial Railway Service	923
New Stations at Surbiton and Richmond, S.R.	925
Derailment on American Concrete Track	937
Railway News Section	939
Personal	939
News Articles	943
Notes and News	947
Contracts and Tenders	949
Legal and Official Notices	950
Railway Share Market	952

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue

New Southern Railway Stations

THE reconstructed stations of the Southern Railway at Surbiton and Richmond, described in this issue, are but the latest of many rebuilt by the company since the amalgamation. To date, they represent the last word in the provision at reasonable cost of facilities which are convenient and attractive to the public, while being from the railway point of view simple to work and economical to maintain. Architecturally, the new stations are adornments to the towns they serve, as well as a source of pleasure to the travellers who use them. As Mr. Holland-Martin, the Chairman of the Southern Railway, said at the recent annual meeting, it is the experience of the company that improved stations bring improved revenue. That is to be expected, just as the provision of the other things the public wants, like cheerful and comfortable trains that run fast and punctually, tends to attract patronage for the sense of well-being they impart, no less than for their purely utilitarian purposes. The Southern, although it may not yet have done much in the way of speeding up its fastest trains, has certainly improved its service all round, and is continuing to do so.

Leonor F. Loree

We record on page 939 the retirement of a figure so prominent in United States railway history since his appointment, when only 39, as General Manager of the Pennsylvania Railroad in 1896, that his withdrawal from active participation in the railway scene is felt to mark the passing of an epoch. Mr. Leonor F. Loree, who has relinquished his presidency of the Delaware & Hudson Railroad after 31 years in office, has during his varied career held the presidency of three important U.S.A. railways, the chairmanship of another, and directorships of 27 other carrying and associated companies. Trained as an engineer, distinguished for his versatility as an operating officer, a well-known administrator, and the protagonist of a new trunk line from New York to Pittsburgh and Chicago, Mr. Loree took the whole railway industry as his province. The vigour of his views upon the conduct of all departments is expressed with a wealth of practical illustration (to say nothing of excursions into history and genealogy) in his book "Railroad Freight Transportation." This is a much wider treatise than its name implies, and its variety is such that it may well be wondered whether in these days of specialisation we can again expect the emergence of such figures as Mr. Loree.

* * * *

The Week's Traffics

The heavy decreases in passenger train earnings of the four main line railways for the past week have added to the disappointment already experienced with regard to merchandise and coal. But in the corresponding week of 1937 the railways benefited from Coronation visitors and the London bus strike, and the passenger train receipts then showed increases of £81,000 on the L.M.S.R., £41,000 on the L.N.E.R., £28,000 on the Great Western, and £32,000 on the Southern. For the 18 weeks of 1938 the earnings of the four railways together amounted to £52,570,000, a net decrease of £46,000 or 0·09 per cent.

	18th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R.	— 68,000	— 56,000	— 9,000	— 133,000	— 162 000	— 0·75
L.N.E.R.	— 47,000	— 47,000	— 20,000	— 114,000	— 26,000	— 0·16
G.W.R.	— 26,000	— 21,000	— 7,000	— 54,000	+ 32,000	+ 0·36
S.R.	— 17,000	— 5,500	— 3,500	— 25,000	+ 110,000	+ 1·67

The Liverpool Overhead and the Mersey Railways have increases for the week of £120 and £269 respectively. A decrease of £174 for the week is shown by the Belfast & County Down, which is, however, £314 up on the year.

* * * *

The Royal Hungarian State Railways

The length of line within the sphere of management of the Hungarian State Railways, according to a Report of the Department of Overseas Trade on Economic and Commercial Conditions in Hungary (His Majesty's Stationery Office, 1s. 0d. net.) is 7,641 km., 6,510 km. of which are the property of the State, and 1,131 km. private or public lines managed by the State Railways administration. The first nine months of the year 1936-37 show a further improvement in revenue, in comparison with the same period of the previous year. Passenger traffic increased by 8·71 per cent. and freight by 14·99 per cent. in the period in question. Altogether, there was an increase in revenue of 13·12 per cent., while expenditure was only 2·83 per cent. higher. Train speeds have been increased and connections improved. There has also been an increase in rapid rail-car services. Special week-end and holiday services at reduced rates have improved tourist traffic. The increase in meat and other perishable traffic for foreign destinations has increased the demand for refrigerator vans. A full report of the working of the railways of Hungary was published in The Railway Gazette of December 24, 1937.

"Splendid Isolation"

Although a railway map shows the L.M.S.R. lines in the Swansea and Merthyr districts of South Wales as completely isolated from the rest of the system, they have "timetable" links with their parent routes in the shape of through carriages between Swansea and Euston, and between Merthyr, Shrewsbury, and the North. However, goods is the principal traffic in this locality, and one of the most important lines in this respect—that from Swansea (St. Thomas) to Brynamman—has a self-contained passenger service that in no case penetrates to other parts of the system. Mr. C. H. Tait, the L.M.S.R. District Goods and Passenger Manager at Swansea, describes some operating features of his area in the May issue of *On Time*. Gradients are severe, and a rise of 1 in 40 between Brynmawr (on the Merthyr—Abergavenny line) and Blaenavon limits the load for one 0-8-4 tank engine to 14 wagons. The flow of traffic is largely towards the ports, so that the Central and South Wales districts provide a useful source of empty wagons for the rest of the system. Of the average weekly total of about 460,000 wagon-miles in the whole area, a wagon-mileage of 200,000 represents the working of empties.

* * * *

The Russian Railway Centenary

The present year has been selected by the Soviet authorities to celebrate the centenary of Russian railways, for the reason that on April 17, 1838, steam traction was adopted for daily use on the Petersburg & Pavlovsk Railway. It appears that rail transport had been used in Russia more than a quarter of a century earlier, for a horse-operated line is stated to have been at work in the Kolinanovsk coal district in 1810. The Grand Duke Nicholas (afterwards Tsar) visited England in 1816 and saw one of Matthew Murray's locomotives haul a train of thirty loaded coal wagons at a speed of 3¼ m.p.h. on the Middleton colliery rack railway, and a model engine was afterwards sent to Russia by the makers (Fenton, Murray & Wood). The Soviet authorities claim that a locomotive was built in Russia in 1833 at Demidov's Nishne-Tigilsk works by Cherepanov, "a self-educated serf," and his son. Cherepanov is stated to have been sent to England to study "everything relating to mining" and to have designed his "land steamer" on the lines of Stephenson's *Rocket*. Whatever be the merit of the claim, there is no doubt that the Petersburg—Pavlovsk line was the first public railway in Russia. Some details of the early history of Russian railways are given on page 944.

* * * *

The Mansion House Association

Sometimes it is asked what connection the Mansion House Association has with the Mansion House. Mr. W. H. Gaunt, President of the Association, at the annual luncheon last week, explained its origin as arising out of the transport difficulties suffered by traders in 1879, when so many railways were appearing, and canals disappearing, and the only controlling authority was the Railway Commission of 1873, which, however, spent most of its time on disputes between one railway and another. For years the Mansion House was the "venue and ægis" of the traders, and the idea of a formal association began about 1880; this association began to publish annual reports about 1882. There were long fights in and out of the Courts, and the Parliamentary Bar made much out of both sides. The principals of the traders' firms usually attended the meeting, and the avocation of the transport manager, as we know it now, was somewhat nebulous. The late Lord Melchett and Sir James Tomlinson were prominent Presidents in their time, and the family of Mr. Vincent Clements, the late Secretary of the Association, were continuously identified as workers in the cause. The membership has been clarified of late years, and now comprises those firms and associations of firms to whom transport is a big feature in their producing industries, and who have sidings, wharves, or actively operate their own transport by road, rail, canal or sea. The meetings are attended by representative transport managers, usually interested in practical operation and anxious to employ all forms of transport.

* * * *

The Future of the Classes

From time to time the suggestion is made that class distinction should be abolished on all British railways, as it has already on many urban and branch lines. Actually, at present, the question resolves itself mainly into one of nomenclature, for it cannot be doubted that on main-line trains there is the need for more privacy and greater comfort than would be provided by a universal class—whether such accommodation be called first class or saloon with a supplementary fare. Prior to 1872 there were three motives which led railway travellers to pay higher class fares, namely, desire for greater speed, for greater comfort, and for more privacy. The policy initiated by the Midland Railway in that year of providing third class accommodation on all trains removed the first of these motives. Subsequent developments, such as the introduction in 1893 of third class dining cars, have diminished the numbers of travellers paying higher class fares. That concession followed those of third class upholstered seats, corridor carriages, and lavatories, and removed from the first class what on January 13, 1894, *The Railway News* called "the monopoly, if not of the comforts, at any rate of the luxuries of travel."

* * * *

Making a Bad Job Better

The National Institute of Industrial Psychology has a title that sounds formidable only to those who do not appreciate the nature of its work. There may be employers who look askance at the words "industrial psychology" as a disguise for interference with their established methods of production; and there are undoubtedly some workers who suspect investigations of the human factor in industry as a means of increasing production without adding to remuneration. The institute has indeed received tributes from commercial enterprises to the increased efficiency among their staffs resulting from the application of its research, but it is clear from these testimonials that the improvement arises from working conditions which save wasted effort and minimise strain. Perhaps the aspect of the institute's work which first occurs to the mind of the public is that of vocational guidance. Unfortunately, in these days it is impossible for everyone to find employment in the class of work for which he is temperamentally best adapted. Hence the particular value today of the work of the institute in "making a bad job better." More funds are required if the institute is to carry on and acquire London premises worthy of its important mission. Support for this cause is to the common interest of all concerned with industry.

* * * *

Approach Lighted Signal on the Underground

In his recent paper before the Railway Students' Association, Mr. Evan Evans, Operating Manager (Railways), L.P.T.B., said that in the dark, with all other objects obscured, as in driving in a tube tunnel, it is difficult to get a perspective to enable one to estimate how far off a red signal is, hence some drivers drive more cautiously

than others. On one long straight section a white light was placed in the tunnel at braking distance from the signal as a guide, but it did not help much, as many drivers still reduced speed on sighting the red light and not infrequently this changed to green when the train was a considerable distance away. Had the driver run at full speed it would probably have done so in time to avoid any check. Such loss of distance and time, repeated by a few trains, soon causes bunching under a 90-second headway. Much better results had been obtained, south of Waterloo, said Mr. Evans, where they had experimented with not illuminating the red signal, if the driver would otherwise have a very long view of it, until the train had reached a pre-determined distance therefrom, calculated to give him ample time to brake satisfactorily. This is another instance of the many ways in which seconds can be saved in tube train working, where every one is of importance.

* * * *

American Concrete Track Experience

In the course of the inquiry into a derailment that occurred last December on the experimental concrete track of the Pere Marquette Railway, it transpired that, although a good deal of trouble had been experienced with the type of fastening used to hold the rail down to the concrete slab, the latter itself had proved entirely satisfactory. As we record on another page in this issue two types of concrete track have been in service for periods varying from nine to twelve years and both are apparently still in good condition. The only trouble appears to have been in connection with the rail fastenings, and it should not prove difficult in the light of experience to provide a thoroughly satisfactory substitute for the type hitherto used. A spring clip such as has been standardised by the Delaware & Hudson Railroad for its all-welded track, and which exerts a strong pressure on the foot of the rail yet provides the necessary elasticity, suggests itself. Such a fastening prevents any movement of the rail laterally and should not be difficult to incorporate in the stirrups to which the existing bolts for holding down the rail clips are secured.

* * * *

The Diesel Brings More Speed to the Middle West

The newest recruit to diesel-electric enterprise in the United States is the Rock Island company, which has recently introduced a whole series of high-speed services aptly dubbed the "Rockets." By the simultaneous introduction of six new units, a double daily service, morning and evening, has come into operation between Chicago and Peoria, the 161½ miles being covered each way in 2 hr. 40 min.; a second service runs from Des Moines in the morning to Chicago and returns in the evening, covering the 357¾ miles in 6 hr. each way; two trains are required for a long-distance service between Minneapolis, St. Paul, Des Moines, and Kansas City, covering the 482 miles between St. Paul and Kansas City in 8¾ hr.; and the last is a service, run in conjunction with the Burlington Company, between Fort Worth, Dallas, and Houston, of which the Rock Island 249½-mile stretch between Dallas and Houston is run in 4 hr. 10 min. Of this new mileage, reaching a total of 2,825 miles daily, most of the point-to-point runs are booked at start-to-stop averages of over 60 m.p.h. Another "Rocket" which is to be introduced by the Rock Island will run between Kansas City and Denver. By these developments, and the already existing diesel trains of the Burlington, Union Pacific, and other lines, the Middle West and Western regions of the United States have become the focus of the greatest diesel-electric railway activity in the world.

Tanks in Tunnels

A noteworthy feature of military transport operations during the civil war in Spain has been the use of railway tracks as roads. An example of this unusual form of rail and road co-ordination was reported recently during the advance of the Nationalist forces towards the Mediterranean. A group of tanks operating in the mountainous country north of Tortosa, found an easy route along the railway line. Following this, they cleared and passed through several tunnels, thus enabling the infantry forces to occupy positions considerably in advance, without storming the ridges. As far as we know, this is the first recorded instance of the use of railway tunnels for the advance of tanks during military operations. There is, however, on record another case also in Spain of a railway being used as a road. This was during the fight for Irun, when the Nationalist military engineers took up the rails of the light railway which runs out of Irun towards Vera, and with some slight alterations, converted it into a road. Electric light was fitted in the tunnels and during the time the ordinary road was impassable and under fire the converted railway served as a safe and excellent line of communication.

* * * *

Weed Killing

Mr. E. V. Brady's paper to the Permanent Way Institution in London last Monday on "Weed Killing on Railways" was appropriate in its coincidence with the season of the year when the conscientious railway platelayer used to begin his war on weeds. Less than ten years ago this war, when it was waged at all, was fought with hand tools, at any rate on this side of the Atlantic. Partly to save labour for more useful purposes, and partly to produce more effective results, the development of chemical weed killing was undertaken, and in the past seven or eight years has reached a stage when most of the principal railways, both in Great Britain and on the Continent, possess up-to-date weed killing trains which, travelling at speeds of up to about 30 m.p.h., quickly destroy the vegetable growth on the track and save the permanent way maintenance men what formerly often caused them weeks of hard labour every spring. Thus another contribution has been made to easing the maintenance of that high standard of track demanded for the safe and smooth conveyance of the heavier and faster loads called for by the operating departments.

* * * *

More Railway Rhythm

A note in *Quota News*, the organ of the L.M.S.R. Commercial Department, informs us that the railways are sending to the publicity managers of British resorts copies of a song entitled "Must it be August," intended to encourage earlier holidays. Presumably this has pretensions to being a melody, and is therefore an advance upon the ritualistic railway chants which daily leave so many thousands of travellers unmoved. Every day on suburban lines sceptical passengers pack themselves like sardines into the leading coaches of trains, simply because railway servants perseveringly intone "there's more room in the rear." It is a matter for surprise that some travellers do not prostrate themselves upon the platform, like pilgrims before the car of Juggernaut, when they hear a porter pushing a barrow warble "mind your backs." Perhaps the fault lies in the fact that the sweetness with which these and similar calls are uttered places the traveller upon his guard just as Ulysses was warned against the sirens of old. The new song, however, is to be recommended to seaside concert parties, which may deliver it with a professional harshness that will carry conviction.

Annual Review of Railway Charges

THE Railway Rates Tribunal has announced its intention of reviewing the standard and exceptional charges of the four main-line companies on May 17, and this will be the tenth review held by that body since the introduction of standard charges on January 1, 1928. This duty is placed upon the tribunal under Section 59 (1) of the Railways Act, 1921, which directs it to review the charges at the end of every financial year unless the Minister of Transport decides that the review need not be held. The Minister has not exercised his power to cancel the review in respect of the year 1937, and the tribunal has therefore followed its usual custom of requiring the railway companies to furnish rather voluminous accounts and statements to facilitate the proceedings at the public inquiry. At this hearing the tribunal has first to comply with Section 59 (3) of the Act in question, which requires it to compare the net revenue of each of the companies for 1937, or the average annual net revenues of the companies for the last three years, with the standard revenues together with any allowances which may have been granted by the tribunal in respect of additional capital raised or provided in respect of expenditure on capital account incurred since January 1, 1928. The standard revenues of the four group companies, including the allowances authorised in respect of additional capital raised or provided as previously mentioned between January 1, 1928, and December 31, 1936, amounted to £51,359,095, but, as the net revenues of the companies for the year 1937 totalled only £37,902,347, they were £13,456,748 short of the standard, although there was an improvement of £2,171,787 compared with 1936.

If, however, the average of the last three years' net revenues is taken, there is a deficiency of £15,840,874, so that by either method of calculation there is a deficiency of considerable magnitude. In these circumstances the tribunal is required to consider whether the deficiency arose through any lack of efficiency or economy in management of the undertakings. No suggestion to this effect has been made by representative traders' organisations at previous reviews, and on this occasion the companies' statements indicate that railway gross receipts increased in 1937 by £7,190,221, while the railway working expenditure rose by £5,480,354. The railways will also be in a position to show that a substantial portion of the increased expenditure was due to rises in the costs of wages and materials, and that their efforts to restrict expenditure have not been accomplished by a sacrifice of efficiency. Should the tribunal be satisfied on this point, it will have to decide whether a similar deficiency between the net and standard revenues of the companies is likely to continue. In this connection particular attention will doubtless be directed to the estimated result of the 5 per cent. increase in rates and charges which was ordered by the tribunal to operate as from October 1, 1937.

It seems clear from the trend of railway earnings that since last autumn there has been a slowing of the trade progression which was evident in the earlier months of 1937. For the sixteen weeks to April 24, the gross railway receipts show an increase of £349,000 over the corresponding period of 1937, which represents considerably less than the sum which should be yielded by a 5 per cent. increase. The decline in freight and mineral traffics, however, makes it very difficult to reach any definite conclusion as to the effect of the increase. In any case, railway expenditure on labour and materials during the current year is running at a higher level than during the corresponding period of 1937, and it is clear that the companies are unlikely to achieve their standard revenues this year. To assist the tribunal in determining whether, in these circumstances, it should order any further modifications in the standard and exceptional charges, the companies have intimated that the period during which the increased charges have been in operation has not been sufficient to enable them to express an opinion as to whether any further increase of charges would result in a material improvement in their financial position, and, for this reason, they do not desire to lay proposals before the tribunal for a further increase. The companies have emphasised, however, that this decision has been reached in consequence of the comparatively short period during which the increased charges have been in operation, and must not be taken to preclude them from bringing to the tribunal proposals for increasing the charges before 1939 if, in their opinion, circumstances justify such a course.

* * * *

A Unified Colonial Transport Service

THE possibility of a general unification of the Colonial transport services forms the subject of some notes by a well-known overseas railway officer which we publish on page 923. In its wider aspect this has already been under consideration, and a recent series of articles in our contemporary *The Crown Colonist* dealt with proposals for a measure of unification of the general administrative services of the colonies. Our contributor, whose suggestions are prompted by a long and varied experience, emphasises the advantages of unification, especially as applied to the transport services overseas. The railway systems of the Crown Colonies, as indeed those of the Dominions and those of this country, originated and grew to maturity as isolated systems, and the design and construction of each seem to have been decided without regard to any established rules of uniformity, by the respective engineers responsible for the construction. In the case of countries where railways were constructed by private enterprise a lack of uniformity is understandable; but in a system of State owned and operated railways, advised and supplied, if not controlled, from a central authority, that same lack of uniformity is regrettable at the present date. Be this as it may, we have the most marked variants both in technique and in practice, such as those pointed out by our contributor, and many others, which should be avoided under a unified administration. We need only recall the old difference of technical opinion as to the gauge of track, a difference of opinion the consequences of which are exemplified particularly by Australia and Africa.

This suggested unification, if carried into effect, would be something like another step towards a new charter for British railwaymen overseas. In a leading article in THE RAILWAY GAZETTE of October 15, 1937, we had occasion to refer to the difficulties experienced by young British engineers, with ambition and desire to acquire experience, in finding new employment after completing a contracted job abroad. A unified colonial transport service—a "C.T.S."—would afford possibilities of transfers and promotion, not only between all the Crown Colonies but also between their railway, harbour, and other services, and under standardised scales of salary so constructed that transfers or departmental promotion would always comprise improved salaries the maxima of which would vary only with the classification of individual railways, the scale being progressive.

Within the past few years there have been several instances of the transference of general managers and chief officers from one colonial railway to another sometimes thousands of miles apart and differing considerably as regards the physical characteristics of the country served and also the language and customs of the people. In effect, as we see it, our contributor proposes that this inter-

change, which has been increasing, should in future be put on a less haphazard basis, so that a young officer starting on his career on one of the smaller systems would know that, given efficiency, there was a definite avenue of promotion to the highest positions on the larger systems, which in future would be regarded as units of varying importance in the colonial railway service as a unified whole. Naturally there may be opposition to our contributor's proposals, quite apart from that forthcoming from those whose mentality resents any change from existing practice and conditions. Be that as it may, we consider his proposals well worth the space allotted to them in this issue, and that they merit the careful consideration of the Colonial Office and the Crown Agents.

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The Transport Directorate of Nigeria

IN April, 1936, a Transport Directorate was established in Lagos with the object of co-ordinating the policy and development of all forms of transport in Nigeria. This new organisation and its functions were described at the time in THE RAILWAY GAZETTE of April 17, 1936, and we now have before us the report for 1936-37 of the Director of Transport, Mr. G. V. O. Bulkeley. In this, the first annual report to be issued, the functions of the Directorate are defined and its organisation is described as analogous to that of a large privately-owned transport undertaking. Executive control of railway, port, and marine affairs is vested in the Director, and he corresponds directly with the Secretaries, Northern and Southern Provinces, in respect of all matters relating to transport. The Chief Commissioners are members of the Transport Advisory Board. The chairmanship of four transport bodies devolves on the Director of Transport, namely, the Transport Advisory Board, the Air Services Development Committee, The Port of Lagos Advisory Board, and the Port Harcourt Advisory Board. Three local area transport committees, for the North-Central, South-West, and South-East of Nigeria, represent their respective local interests on the Transport Advisory Board. Rail, road, and inland waterway affairs are dealt with by the Transport Advisory Board, while the Port Advisory Boards deal with the operation and development of the two ports. The Colliery Manager reports to the Director of Transport. The Directorate publishes a monthly Transport Services *Bulletin*, and issues periodical "Notices to Airmen," as well as the annual amendments to the Communications Guide for Nigeria.

No attempt is made in the Report of the Director of Transport to duplicate the working details which appear in the annual reports of the railway and other departments. The last annual report of the Nigerian Railways was reviewed in THE RAILWAY GAZETTE of January 21, 1938, page 100, when the principal statistics of working were quoted for the periods 1934-35, 1935-36, and 1936-37. The report of the Director of Transport describes briefly the various departments under the control of the Directorate. The railway is organised on the departmental system, as in force on the Great Western Railway of England. It is considered that this system is best suited to the conditions of the colonial type of railway, which requires strong headquarters control. The four largest British-controlled railways of this type (those of the Sudan, Nigeria, Kenya & Uganda, and Tanganyika Territory) are so organised. The alternative, the Divisional System, is regarded as being, among other reasons, somewhat cumbersome for colonial conditions. The phenomenal recovery of Nigeria from the recent trade depression has thrown on the transport departments a greatly increased volume of work, which has coincided with their emergence from a long period of financial stringency, staff retrenchments, and maintenance arrears. The situation demanded a special effort, and the credit for the performance shown by the tonnage handled by the railway was due, according to the General Manager's Report, "to the hard work and loyalty of the staff, both African and European." Reference is also made to the fact that since the financial reconstruction and commercialisation of the railway (see THE RAILWAY GAZETTE of January 1, 1937) together with the greatly increased earnings, the monetary position of the railway is satisfactory, all interest payments and renewals contributions having been met and a moderate surplus kept in hand for future requirements. During 1937 liberal adjustments and awards were made in respect of African staff salaries. In developing the railway to deal with increasing traffic, improvements are being studied in providing additional train crossing places, alterations to station yard layouts, improved coaling methods, and better access to port quays; as well as reducing the average percentage of locomotive and vehicle stock awaiting repairs. Commercial train speeds are being improved, as well as train loading and the turn-round of rolling stock.

The Transport Advisory Board has been called upon to consider many important problems, such as the obsolescent Minna-Baro railway, the trunk-road policy, the Forcados bar, and the allocation of railway wagons in the north. Road transport matters are dealt with, in the first instance, by the Local Area Transport Committees, the problems arising in South-West Nigeria being of particular complexity, as the area between Lagos and Ilorin (about 240 miles north of Lagos) is one of extensive competition between railway and road. The railway reduced its charges in this area to a flat rate of twopence per ton mile, inclusive of 3s. 6d. port charge for shipping, and competing road vehicles pay a double licence. In spite of this however, rate cutting continued until the formation recently of the Nigerian Motor Union, represented on the Local Area Transport Committee, and it is hoped this will bring about a position of stability in this vexed question. Co-ordination of Nigerian transport, says the Director's Report, offers a wide field of progress, including increased door-to-door transport, facilities being given for the railing of loaded lorries with their drivers between intermediate centres, and common carriage on inland waterways. Railway development should also include diesel-engined buffet railcars for business men between Lagos and Ibadan, increased through speeds, and eventual double-tracking of the line between Lagos and Ibadan and Kano and Kaduna. Air transport is Nigeria's most recent adventure and the Air Services Development Committee, under the Transport Directorate, is charged with the establishment of the proposed internal air service, which may revolutionise cross-country travel in Nigeria. The report is accompanied by a map showing rail, road, waterway, and air routes throughout the Colony.

U.S.A. LEVEL CROSSING ACCIDENTS.—According to a study recently made on the Erie Railroad, U.S.A., approximately 22 per cent. of all motor accidents at road-rail level crossings are caused by motor vehicles crashing into the side of trains. Accidents at level crossings on this railway last year totalled 169, in 37 of which the motorcar ran into the train. The report discloses that 114 accidents, or 67 per cent. of the total, occurred at crossings where there is extra protection for motorists in the shape of signals or watchmen. In 46 instances, or 27 per cent. of the total, accidents resulted from motor vehicles being stalled on the tracks in front of approaching trains. Cars crashed through crossing gates after they had been lowered in 10 instances, and in 34 cases watchmen's stop signals were disregarded.

XUM

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Overturning Tests in South Africa

Nigerian Railway,
Offa, April 30

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Considering how valuable and praiseworthy were the methods adopted by the South African Railways in their researches into overturning on curves, it is all the more regrettable that in the presentation of the results, at any rate as outlined in THE RAILWAY GAZETTE of March 25, such misleading statements should be made.

I gather from the context that the tests were mainly undertaken to appeal to the lay public. Any of the lay public who read the article, and even those with a fair technical knowledge, are led to believe that height of centre of gravity, and cant, scarcely affect the matter at all. This is quite an incorrect idea.

Anybody with a full technical knowledge of the subject, who analyses the article carefully and notices fully the all-embracing but modestly tucked away qualifying remarks, will agree that overturning is independent of height of centre of gravity and cant, merely at any one speed for any particular cant; this is a condition which exists for only a very small proportion of the time that trains are running.

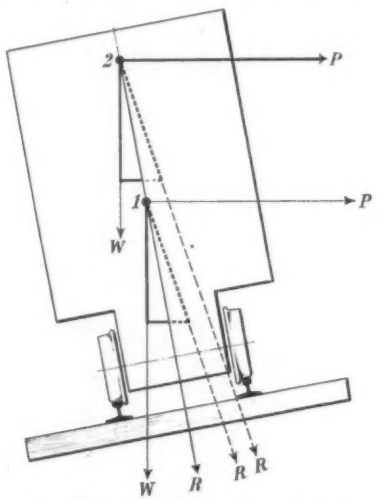


Diagram illustrating the effect of centre of gravity on the direction of resistant

The diagram shown illustrating the statements about centre of gravity, is to the lay public quite misleading, and to the technically educated, useless. It makes use of what is meant to be the principle of the parallelogram of forces in a pseudo-scientific way, but, by not showing the forces to scale, does not illustrate any actual condition at all.

The diagram should be as shown herewith.

Yours faithfully,
R. E. BROOMFIELD

Railway or Railroad

London, May 3

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—The uncertainty in the choice of a word, in the early days, to describe a "railway" or "railroad" (noted in the interesting editorial in THE RAILWAY GAZETTE of April 29), has occurred also in the Spanish language. Indeed it is there even more noticeable, since at least two words are still used in Spain to express the same thing: thus, the two principal systems there, to give them their full legal titles, are the Compañia de los Caminos de Hierro del Norte de España; and the Compañia de los Ferrocarriles de Madrid a Zaragoza y a Alicante. The most commonly used word is *ferrocarril*. *Camino de hierro* is literally in English, "road of iron," and *ferrocarril* is also literally "iron road." The word *carril* in Spanish is now used also, synonymously with *rail* (or *riel* in South America) as the equivalent for the English "rail,' but *carril* in old Spanish was a lane or track, a rut or furrow.

I would draw attention to the noticeable distinction that in the Continental languages there is no reference to a "rail." They all refer, in one way or another, to an "iron" road. It seems to have been in the English-speaking countries only that we have used "rail," rather than "iron," to describe the principal element of the track.

Incidentally, it is interesting to note, in connection with this question of railway terminology, that the South American countries have evolved their own idioms, which differ from those of Spain, in much the same way as the terms in use in the U.S.A. differ from ours in the old country; "tie" for sleeper, has its parallel in *durmiente* for *traviesa*, and there are many other similar differences.

Yours faithfully,
GEORGE L. BOAG

Early Railways and Gauges

In preparation for the Great Exhibition of 1851, Charles Knight issued early in that year his "Cyclopædia of the Industry of All Nations," and the article on railways is of particular interest as setting out briefly and accurately the introduction of rail transport. A few years later various fallacious statements gained wide currency (and are still accepted in some quarters), with the result that the antiquity of the flanged wheel has been obscured and the flanged plate rail and stone sleeper given false places in the story of permanent-way development. Of the introduction of railways in Great Britain, Knight said: "Wooden railways or tramways were introduced in the collieries of the north of England in the early part of the seventeenth century. They were adopted in order to reduce the labour of drawing coals from the pits to the places of shipment in the neighbourhood of Newcastle-upon-Tyne." Describing the lines as "wooden rails on transverse sleepers," Knight added that the vehicles used "were generally waggons, containing from two to three tons of coal, mounted upon small wheels. The wheels were provided with a flange of projecting rim, which, by coming in contact with the side of the rail, retained the waggon upon the railroad."

Regarding the introduction of iron rails, Knight said: "About the year 1767 iron plates were laid upon the wooden rails on a railway at the Colebrook Dale iron works. Some time after the experiment at Colebrook Dale, cast-iron rails, with an upright flange, were brought into use at the colliery of the Duke of Norfolk, near Sheffield, in 1776. Originally they were fixed upon cross sleepers of wood, like those used to support wooden rails; but about the year 1793 blocks of stone were introduced as supports, instead of the wooden sleepers. Various inconveniences attendant on these *plate-railways* led to the use of *edge-railways*, which have now almost entirely superseded the previous form. The first edge-railway of any considerable extent was completed in 1801 for the conveyance of slate from the quarries of Lord Penrhyn. The decided advantages of edge rails were so well appreciated by the coal owners of Northumberland and Durham, that they were adopted extensively by them within a few years after the successful experiment at Penrhyn."

On the subject of gauge, Knight remarks: "In the old colliery tramways, 4 ft. was not an uncommon width for the *gauge* of the rails, but many lines were less. Some of the colliery railways of Northumberland are 4 ft. 8½ in.; and from these the Stockton & Darlington, Liverpool & Manchester, and other lines, took their gauge. The advantage of uniformity has led most companies to follow this example."

PUBLICATIONS RECEIVED

The Fiftieth Annual Report on the Statistics of Railways in the United States. Prepared by the Bureau of Statistics, Interstate Commerce Commission, Washington; Superintendent of Documents. 11¾ in. by 9½ in. 282 pp. + 174 pp. Price, in cloth cover, $1.25.—We have just received from the Bureau of Statistics of the Interstate Commerce Commission, the annual statistical report covering the year ended December 31, 1936. This report, which includes also selected data relating to other common carriers subject to the Interstate Commerce Act, is an invaluable record, but the wealth of detailed information which it contains unfortunately results in publication a year or more after the closing of the period to which the information relates. In the main, it deals with statistics of steam railways, the report form of which was modified in various particulars for the year 1936 chiefly to make the schedules conform with the new rules for separating expenses between freight and passenger services. It appears that all classes of steam railways owned 240,104 road miles within the United States at the close of 1936, a decline of 1,718 miles during the year. The number of steam railways reporting in that year was 1,224, or 37 fewer than in 1935, a reduction explained by mergers and abandonments. The abstracts of reports rendered by operating steam railway companies are as usual excellently codified and constitute a distinct section of the volume with separate pagination. Comprehensive indexes make the whole of the wealth of data contained in this annual report readily available for reference.

The Brotherhood of Railway Clerks. By Harry Henig. London: Humphrey Milford, Oxford University Press, Amen House, Warwick Square, E.C.4; New York: Columbia University Press, Morningside Heights. 8¾ in. × 5½ in. × 1 in. 300 pp. Price 15s. net.—This study of the history, aims, and accomplishments of the American labour organisation known as the "Brotherhood of Railway and Steamship Clerks, Freight Handlers, Express, and Station Employees" is well written and carefully documented, and, in a foreword, the Grand President claims that the work is "of value not only to the brotherhood but to anyone interested in the problems of industrial peace and welfare." Originally a union of railway clerical employees, the brotherhood has enlarged its scope to cover additional classes of employees and forms of transportation. Professor Henig describes it as "an amalgamated craft union embracing workers all the way from white-collar employees to common laborers. Generally speaking, however, it claims jurisdiction over all railway, express and certain steamship employees whose duties are, in important part, clerical." The author records that the brotherhood was born on December 29, 1899, and for the first sixteen years of its existence, the membership never exceeded 10,000, but in 1935 it had grown to 72,500.

After a chapter on "the brotherhood before maturity comes" is one describing the changeover from Federal control to private membership, and Professor Henig then proceeds to record the wages position up to the passing of the Railway Labor Act, 1926, which repealed the Transportation Act of 1920, abolished the United States Labor Board, and requires that "all disputes between a carrier and its employees shall be considered and, if possible, decided with all expedition, in conference." In the next chapter are reproduced some important statistics as to earnings and living standards, and these figures present a clear picture of the disastrous effects of the depression in America.

Perhaps the most interesting part of the book is that which tells the story of the establishment by the brotherhood of a national bank in 1922. In answering the question "What prompted the union to go into the banking business?" Professor Henig says that "some officials saw in a union bank an opportunity to put the brotherhood funds at the disposal of labor interests—wage earners, farmers, and co-operative enterprises." The venture proved a failure and the bank closed its doors in 1930, but, apart from this conspicuous illustration of mistaken judgment, the author finds that "on the whole and especially after 1928, the organisation has shown evidence of effective and intelligent leadership." The book is a **useful** contribution towards an understanding of labour problems in the United States of America.

Some Aspects of Track Maintenance on the Peiping-Suiyuan Railway (China). By T. King. Reprinted in brochure form for private circulation from the *Journal of the Association of Chinese and American Engineers*—Some of the principal features—including the Nankow Pass section—of this interesting line were described in our issue of September 17, 1937. The railway has since passed into the hands of the Japanese, and, though some of the supervisory Chinese staff is still retained in advisory capacities, it is controlled and officered entirely by South Manchuria Railway personnel at present. This pamphlet is the record of an address by Mr. King, then Chief Engineer of the Peiping-Suiyuan Railway, delivered at Peiping early in 1937, before the present hostilities, and deals with the peculiar maintenance problems of this railway. Until recently, curve superelevation for the low speeds run was excessive, with correspondingly heavy wear of the rails, especially in the Nankow Pass, with its 1 in 30 grades. Latterly, this fault was being remedied, but still there remained curves without transitions. In an effort to reduce sidewear hand lubrication of rails was introduced, for the cost of installing even the cheap but effective rail lubricators standard now for some years on, *e.g.*, the Southern Railway in this country, was considered too high. Maintenance of gauge was, as might be expected in such circumstances, a great difficulty, and on 600-ft. curves the track spread up to 1¼ in. To prevent this, gauge rods or bolts were introduced. Only very recently were the simple means available to prevent creep—which hitherto had been tolerated to an extraordinary extent—adopted. In the long tunnel near Nankow Pass summit corrosion was very rapid, and when new rails were laid in 1936 they were painted with coal tar and were to be repainted annually. Upheaval of the track due to frost was also a great difficulty, and was being combated by filling in formation in affected cuttings from a level below the frost line with cinders.

In contrast to the foregoing, reconditioning of worn points and crossings with oxy-acetylene welding plant was practised continuously. Several types of reinforced concrete sleepers, two of which are illustrated by drawings in the pamphlet, have been on trial for some little time with varying results.

Holidays in Belgium and Luxembourg.—We have received from the Office National du Tourisme de Belgique and the Office du Tourisme de Belgique et du Grande Duché de Luxembourg of 48, Place de Brouckère, Brussels, and 98, Regent Street, London, two attractively produced booklets setting out some of the charms of two countries, Belgium and Luxembourg, which it is pointed out are unique in offering so many natural beauties and such a profusion and variety of artistic treasures in such a small area. Also included is a leaflet setting out the services, fare arrangements and excursions on the Dover-Ostend route.

Cork Floor Tiles.—Cork flooring tiles allow variety of design and durability, without the tendency to coldness and amplification of noise associated with an ordinary tiled floor. The success with which cork tiles may be used to harmonise with interior decorative schemes is shown in an illustrated booklet published by G. Stephenson & Co. Ltd., Windsor House, Victoria Street, London, S.W.1, maker of Gesco tongued and grooved cork floor parqueting tiles. Gesco tiles are also suitable for the interior furnishing of railway rolling stock, and, as recorded in our *Electric Railway Traction Supplement* of April 1, have been selected for the floors of the convertible saloons for the recent L.N.E.R. Tyneside electrification. In such cases their noise-absorbing properties are particularly useful. The tiles will take a high polish, but even so retain a non-slip surface. Dust is not absorbed, rendering them easy to clean and polish.

THE SCRAP HEAP

In north-western Tasmania, about 25 miles from a railway line, there is a signboard bearing prominently the words, "Look out for the Trains." We understand that this was erected some fifteen years ago, at a time when a railway in that direction was surveyed; it was, however, never built.

* * *

The locomotive bell from engine No. 18 of the abandoned Sandy River line, Maine, U.S.A., has now been hung in Campellton United Church, Prince Edward Island, off New Brunswick, to which it was presented by a railway enthusiast from Bloomfield, Prince Edward Island.

* * *

A delightful anomaly has been discovered in connection with the French Government preparations for the visit of the King and Queen to Paris on June 26. For the King and Queen will travel by train, and the French, courteous as ever, would not dream of allowing their Majesties to arrive at the dark and dismal Gare du Nord. To their horror, however, they have discovered that the special railway station in the Bois de Boulogne reserved for royalty arriving from across the English Channel was sold years ago to a painter, who converted it into a private house and studio. The President of the French Republic has consequently been compelled to ask the painter's permission to convert his home back into a railway station. This is now being done.—*From "I See Life," by Charles Graves in "The Daily Mail."*

* * *

FLOWERS AT CANADIAN PACIFIC STATIONS

Mr. J. R. Almey, Winnipeg, Chief Horticulturalist of the Canadian Pacific Railway Western Lines, is now on a visit to inspect the company's gardens along the right of way from Fort William to Vancouver. Recently, Mr. Almey despatched from his department 9,600 packages of garden seeds to agents, section foremen and others on C.P.R. property whose pride it is to beautify with flowers and shrubs the gardens all along the line. More than 125 other seed varieties for special use were also supplied by Mr. Almey for the use of advanced amateur and professional gardeners in the company's employment, whose equipment of hot beds and greenhouses makes it possible for them to grow bedding plants for early use. A half ton of lawn grass seed and from one to two tons of commercial fertiliser are also supplied by this department of the railway. To see that these supplies are used to best possible advantage and to give the growers the benefit of his scientific knowledge of horticulture, Mr. Almey is following up the seed distribution with his annual personal visit covering a period of several weeks. Nearly $200 worth of special seeds, many imported direct from growers in England, on the Continent, and in the United States, as well as from Canadian seed growers are included in the annual output.

* * *

JOSEF TRICK

Josef Trick, to whom many valuable advances in German railway working are due, was born at Gebweiler, Alsace, on September 10, 1812. Left an orphan when only 3 years old, he was brought up by relatives and, after some schooling at Gebweiler, went to work at the works of the Schlumberger Brothers. In 1831 he joined Escher, Wyss & Co., Zurich. In 1841, one of the leading professors who did so much for technical education and mechanical engineering, made him his assistant at the Polytechnic, Karlsruhe. Trick was much influenced by this man, Redtenbacher by name, and came to abandon the French point of view of the relation of mathematical science to practical work and adopt the German, where mathematics have a more accessory position. A few years later Emil Kessler, the associate of Mesmer, wanted an engineer, particularly for assisting him in building the woollen mills at Esslingen and the well-known engineering shops. He chose Trick, who became designer to the Esslingen works in 1847 and soon showed his ability, designing the 0-6-6-0 coupled locomotive for the Geislinger incline, then an achievement of the first order. He had previously worked out an 8-coupled design. Trick's designs, although bearing the Kessler characteristics, had many original features due to him. The Trick valve gear is well known. It resembled the English Allan gear but was developed quite independently and used on the first real express engine of the Württemberg railways in 1858. His own slide valve, with its double port openings, was of fundamental significance in locomotive development. Trick, who remained true to his adopted country, died at Esslingen on April 20, 1865.

* * *

THE SOUTH EASTERN RAILWAY

The South Eastern Railway *is* a railway! It is necessary to say so, because some people believe it is a canal, some others a tramway, and the great majority a steam plough in a field. The reason it is a railway is because it is called so by Act of Parliament. The reason it continues to be a railway is on account of the national respect for the majesty of the law! The South Eastern Railway starts indifferently from Cannon-street and Charing-cross and goes back again. Sometimes, by mistake, it goes elsewhere. Occasionally it gets to Folkestone, and tries to throw itself into the sea. This is good for Folkestone, because multitudes of philanthropists reside there in order to assist the deed.

The S.E.R. is generous to excess. It will always buy old cabs, broken-down omnibuses, or mouldy perambulators from anybody who doesn't care to keep them until next cold weather. A number of these vehicles tied together in a string is called a South Eastern Railway train. At the end of each train there is a stationary engine. It is because no more of these engines can be procured that there are no railways in China.

The S.E.R. is profoundly philosophical. Its timetable is the only instance of the human mind fully defining eternity. The S.E.R. is going under a tunnel to France, and the Government is going to spend twenty millions on fortifications to prevent it ever coming back. The property along the S.E.R. is all freehold. They couldn't make the leases long enough. If you want to travel by S.E.R. you take a ticket and walk. —*From "The Railway Times" of March* 15, 1884.

* * *

The Manistique & Lake Superior Railroad no longer has an ordinary passenger service, but to meet local needs a scheduled service is maintained six days a week carrying mail and a limited number of passengers. This is operated by a 1923 Buick sedan fitted with three pairs of rail trolley wheels, and in addition retains its own pneumatic-tyred back axle. This vehicle takes 75 min. to cover the 35 miles between Shingleton and Manistique, Michigan.

* * *

An Australian level-crossing warning issued by the Queensland Railways

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

ARGENTINA

Beef Transported by Rail to Bolivia

During the month of March an experimental shipment of 10 tons of Argentine frozen beef was despatched by rail to La Paz, Bolivia, from the Buenos Aires terminus of the Cordoba Central Railway, at present being operated by the State Railways. The beef was transported in special refrigerator wagons and arrived at its destination six days later in good condition, after a journey of some 1,600 miles. In view of the success which attended this trial shipment, it is stated that arrangements are under consideration for the exportation to Bolivia of 300 tons of Argentine beef a month over the same route.

Cotton and Rice Production

Two commodities, the cultivation of which seems destined to develop into an important national industry, with resulting benefit to the railways serving the zones affected, are cotton and rice. For some years past the production of Argentine cotton has attained considerable proportions, the average for the last nine years having been just under 42,000 tons per annum, while the yearly average for the quinquennial period 1923-24—1927-28 was some 18,000 tons. Owing to the drought, last year's production was unusually low—slightly over 31,000 tons—but this year the first forecast issued by the Ministry of Agriculture estimates the production at 72,000 tons, or 40,830 tons higher than the previous year, but some 9,000 tons lower than the figure for 1935-36, which was the highest on record.

As regards the present year's rice crop, reports based on a detailed inspection of the plantations in the Province of Corrientes—the chief centre of this industry—state that the condition of the 12,000 hectares (30,000 acres) sown with rice is excellent from the standpoint of both quality and yield, the total production being estimated at about 48,000 tons.

SOUTH AFRICA

Travel Association of Southern Africa

A recent statement by the promotion committee of the Travel Association of Southern Africa (referred to in THE RAILWAY GAZETTE of May 28, 1937), indicates that pledges of contributions from non-State sources have been made amounting to about £21,500, with some prospect of increasing the amount to £22,000. The Minister of Railways had set the minimum of £12,500 as the point at which the company could proceed with its activities. The Travel Association will therefore have an income, with State contributions, of from £86,000 to £88,000 a year guaranteed for five years.

The Minister of Railways has stated that the most expeditious way to deal with the problem of the travel industry would be to register a company. Certain objections were, however, pointed out by the law advisers, and the Minister decided to establish the association by a short Act and to present to Parliament a short Bill during the first session of the new Parliament.

The principal terms of the Minister's original undertaking are not affected, and continue to provide for a combined Government and railway grant in the proportion of three to one, against guarantees from non-State sources of annual contributions for five years, and for control of the Travel Association by a board of five members, of whom four will be appointed by the Minister from a panel of names compiled by contributors, and an advisory committee.

INDIA

Government Resolution on the Bihta Derailment Judicial Report

After consideration of the Bihta accident judicial report [a summary of which was contained in an editorial in our issue of April 29.—ED. *R.G.*] the Government of India has directed the East Indian Railway administration, without admitting negligence and as a special case, to consider and settle all reasonable claims for compensation for any injury arising directly out of the accident. The Government further proposes to appoint an expert independent committee to inquire into the design, purchase, and continued purchase of "XB" engines as recommended by Sir John Thom. The Government wishes it to be known that the Railway Board has already issued instructions to railway administrations regulating the speed limits to be observed by "XB" engines under certain conditions, pending receipt of the report of the expert committee. All questions arising from the report, including that of responsibility, if any, of the railway administration for the accident are under the consideration of the Government of India.

"XB" Engines Discussed in Legislative Assembly

As a result of the publication of Sir John Thom's report on the Bihta inquiry, two members of the Central Legislative Assembly gave notice of adjournment motions to discuss matters arising out of the report. Sir Thomas Stewart, Member for Railways and Communications, however, assured the House that the Government was most anxious that there should be ample opportunity for free and full discussion of this important document. A day would accordingly be allotted early in the Simla session for this purpose. In view of the public uneasiness in connection with the use of "XB" engines, pending the report of the expert committee that the Government proposes to appoint in accordance with Sir John Thom's recommendation, the Member for Communications later made a statement in the House to the effect that the Railway Board had issued instructions to railway administrations that the speed of "XB" engines should be restricted to an absolute maximum of 45 m.p.h. over any section where track distortion attributable to actual hunting, or where a tendency of these engines to hunt had been experienced within the last twelve months. In addition, no engine of this class which had shown any abnormality in running would be put back into service without the permission of a responsible power officer. Railway administrations had also been instructed to submit to the Senior Government Inspectors, to the Railway Board, and to the Chief Controller of Standardisation a quarterly statement of abnormal occurrences such as track distortion attributable to the oscillation of locomotives. A special German device to minimise hunting would also be fitted to "XB" engines.

Assurance of Safety at 45 m.p.h.

Questioned on the advisability of discontinuing the use of these engines on mail and passenger trains, until the report of experts was available, Sir Thomas stated that "XB" locomotives had not been running on mail trains on the E.I.R. for several years, and had recently been withdrawn from mail train service on the E.B.R. Government was convinced that there was no danger in the running of these engines at 45 m.p.h. The unwillingness of Government to withdraw these engines altogether from passenger services was not due to a paucity of engines.

Sir Thomas Stewart's statement does not explain how the Railway Board proposes to insure that the speed of "XB" engines shall not exceed 45 m.p.h. A similar speed restriction was in force at the time of the Bihta disaster, and, though Sir John Thom held that the train was running at 50 or 55 m.p.h. when the derailment occurred, he was not inclined to blame the driver who could hardly be expected to keep within the speed limit, particularly at night, without a speed indicator; it is possible that the Railway Board intends that the engines should be fitted with speed indicators and perhaps speed recorders. [See also news paragraph on page 947.—ED. *R.G.*]

Manufacture of Locomotives in India

Though official and non-official views on the possibility of the manufacture of locomotives in India as a commercial proposition are opposed, the un-

compromisingly negative reply that was recently given to a question on this subject in the Central Legislature does not do full justice to the attitude of the Government. It had gone into the matter very thoroughly some two years ago and was convinced that the establishment of a factory for the supply of locomotives to the Indian railways would be attended with serious financial losses. Nevertheless, it has now taken an important step towards self-sufficiency in the manufacture of metre gauge locomotives in this country. The B.B. & C.I.R. workshops at Ajmer have for many years been building metre gauge engines for use on that system. It appears that without a special amendment of the existing Act, these shops are precluded from manufacturing locomotives for other Indian railways. Mr. B. M. Staig, Financial Commissioner of Railways, recently announced at a meeting of the Standing Finance Committee that in response to a recommendation made by the committee in June last, the restriction had been removed by an amendment of the Act. The committee accordingly gave its approval to the manufacture of nine metre gauge engines for the Madras & Southern Mahratta Railway at the Ajmer workshops. It was explained that engines turned out in these shops were not 100 per cent. Indian, as some of the parts had to be imported from abroad.

SPAIN

Nationalist Railway Renewals Programme

[In the news section of our issue of April 8, we published a telegraphic summary of the recently decreed railway renewals programme in Nationalist Spain. We have now received from our correspondent the amplification and correction of that message given below.—ED. *R.G.*]

The 30 vehicles referred to in the eighth line of the message as published are brakevans and not railcars. The allotment of funds for expenditure in 1938 against this new programme and the locomotive programme of June, 1934—already partly contracted for—is limited to 15 million pesetas for rolling stock, 7 millions for locomotives, 3 millions for axles, and 6 millions for track material. The remainder is to be spread over two or more successive years. The contracts for the material will in all cases be let by the Ministry of Industry and Commerce, subject to the inspection of the Ministry of Public Works. The cost will be defrayed by the State and the amounts will be charged to the railway companies to which the material is supplied in each case, and considered as financial advances until, in the words of the Decree, the moment in which a definite regimen shall establish the relations between the State and the companies.

The Decree of June 15, 1934, was summarised in THE RAILWAY GAZETTE of June 20 of that year, on page 1103. It arose out of an appeal by certain firms who were threatened with a partial stoppage for want of work owing to the inability of the railway companies at that time to give fresh orders. The Decree authorised the acquisition of 150 new locomotives, of which 40 were for the Northern of Spain, 60 for the M.Z.A., 25 for the Andalusian Company, and 25 for the National Western, the cost to be defrayed by the State as a contribution to the capital of the State as a co-partner of the railways. The outlay was to be spread over a period of six years, and the orders then given and partly executed will form a part of the programme laid down under the new Decree.

FRANCE

Standard Types of Rolling Stock

One of the first tasks of the National Railways in the reduction of operating costs is the standardisation of rolling stock, and the company is now engaged in selecting and designing a number of standard types embodying the latest improvements and suitable for mass production. By this means it is also expected to make substantial savings in prime costs. Only one type each of express and goods locomotives will be ordered this year, namely, the Chapelon Pacific and the Nord 2-10-0 goods. Of these 45 of the former and 50 of the latter will be built.

Co-operation of Firms in Mass Production

Other improvements will consist mainly of standardising locomotive parts to make them as far as possible interchangeable, thus simplifying repairs and maintenance. Locomotives may then be repaired in any workshop and this will reduce the time they are out of service. The company will also request private firms to co-operate and make a parallel effort to organise the industry for mass production so that costs may be cut down. Fifty new railcars are to be ordered this year, as well as 10 electric locomotives of existing types, for the Paris—Bordeaux line, the electrification of which from Tours to Bordeaux is to be completed by the end of the year.

Conversion of Wooden Coaches

In announcing the foregoing, M. Jean Lévy, Chief Mechanical Engineer, said that, in the interests of safety, existing wooden carriages would be rebuilt with steel bodies (as described in THE RAILWAY GAZETTE of April 29) as they were sent for repairs. Several hundred carriages a year would thus be strengthened. The weight of the reinforced coach will not exceed that of the wooden coach, about 37 tons. Improvements will also be made, especially in regard to ventilation, in the new light-weight all-steel coaches, weighing 35 tons, of the former State Railways on the basis of which future coaches will be designed.

SWITZERLAND

Easter Traffic

Winter sports traffic, owing to weather conditions, did not play such an important part in the Easter movement this year as last, but the figures in general showed a slight improvement. The Federal Railways ran 438 specials (173 of which were from Zurich), and receipts for the period from April 14 to 18 amounted to fr. 3·3 million, an increase of 7·3 per cent. over the corresponding days in 1937. The districts chiefly favoured were the lakes of Lucerne and Geneva and the Lugano and Locarno centres.

Summer Tourist Specials Begin

The first Swiss specials of the season arrived on Good Friday, both via Boulogne and Ostend, bringing some 1,600 tourists from England. A considerable proportion of these stayed at Lucerne (where the Polytechnic Association was celebrating its 50th anniversary), and the remainder proceeded to Lugano, the Bernese Oberland, and Montreux.

DENMARK

New Train Ferry Vessel

The Danish State Railways have ordered a new train ferry motorship from Helsingør Skibsværft A/S (Elsinore Shipyard) for the Great Belt crossing. The overall length of the vessel will be 105 m., which is 3 m. longer than the existing ferries, and three railway tracks will be provided. The engines will be Burmeister & Wain diesels giving 5,500 h.p., as compared with 4,500 h.p. in the older ferries, and the speed will be 16½ knots, against 15½ knots. The new ferry will be ready for service in the first half of 1939, and its cost will be about Kr. 4 million.

The Oddesund Bridge

The Oddesund bridge in northern Jutland is now nearing completion. The official opening will take place on May 15, and King Christian has promised to be present at the ceremony. The bridge is about 500 m. long and has cost about Kr. 6·4 million. A description of the bridge appeared in THE RAILWAY GAZETTE of September 3, 1937, pages 394-6.

State Railways Model Railway at Copenhagen Exhibition

During April a tourist and traffic exhibition was held at Copenhagen, and the Danish State Railways, had a large stand with a model railway. The system comprised about 150 yd. of track, 25 working signals, of which 17 were automatically controlled, 8 controlled points, and 28 isolated track sections. A complete set of electric signalling apparatus as used on the State Railways was installed. The plant is to be used for educational purposes at the training school.

NOTES ON A UNIFIED COLONIAL RAILWAY SERVICE

Some suggestions by a colonial railway officer for the unification of the transport services of the Crown Colonies

THE unification of the colonial administrative services, or rather, the tentative steps which have been taken to achieve that desirable consummation, have been described in a recent series of articles published in *The Crown Colonist*. It would appear that the time is ripe for a bolder colonial transport policy, in which the Crown Colony railway service would be unified, under long range grouping, as a section of one inter-related colonial transport service.

History and Origins

The tendency has been for the Crown Colony railways rather to regard themselves as minor editions of the main-line railways in the United Kingdom, whereas their proper relationship should be that of the integral units which, under grouping, form the four British railways. It was perhaps not unnatural, in the early days of colonial railway construction and consolidation, for each system to become a law unto itself, to develop in its own way and initiate its own salary scales and conditions of service. For the same reason it is clearly comprehensible why civil and mechanical engineering practice, and operating arrangements, should have been individual and parochial, rather than interrelated. But dimensions of time and distance are no longer subject to the same limitations. Colonial transport, born in the days of a "steamship empire," is surely now ripe, through the medium of the air mail, for a comprehensive measure of unification. The reform would be an evolution, rather than a revolution. Models already exist and the change might be partly on the basis of the existing railway co-ordination in India and partly moulded on the principles introduced by the recent international Transport Conference for all African countries south of the equator.

Similarity of the Systems

In reviewing the Crown Colony railways three fundamental similarities appear: the railways function in tropical countries, their European staff occupy supervisory posts only, and their common policy is to train and utilise the services of the native peoples to an increasing extent. Besides these three fundamental conditions there is a great deal in common between the technical and operating problems and requirements of railways traversing tropical countries. Such requirements vary little in principle with the gauge of the track. Principle and detail which have proved effective in one dependency, and which are simple and readily understood where necessary by the native staff, should prove of equal value in the others. Methods of securing with single track an elasticity of traffic density, to meet the seasonal agricultural traffic conditions which obtain in tropical lands, must equally apply to all. Systems of native staff training, together with the standards of competency and examination required to justify incremental salary increases or promotion, are also susceptible of standardisation.

European Staff

The European personnel of the Crown Colony railways are at present subject to scales and ranges of pay which are insufficiently related from the viewpoint of a unified service. The result is that while transfers or promotion can be effected in some cases, in others they are impracticable owing to the varying salaries applicable and the difference in the conditions of service. A unified colonial railway service, in which the salary scales were so planned that transfers on promotion would be the normal and regular procedure in all grades of the European staff, would offer manifest advantages. Under such a regime, progressive careers would open out more positively to able and ambitious men, during which they could gain experience in various colonies, with the resultant widening of views and railway knowledge. It is not too much to say that no European officer of ability should remain for more than ten years on the same Crown Colony railway, if narrowness of outlook is to be avoided.

Technical Advantages

With regard to technical interrelation it may be said that the engineering staff of the Crown Agents are already doing what they can to further this. Their efforts in this direction, however, can only take the form of persuasion. It is suggested that authoritative co-relation together with regular consultation between the railway administrations themselves, as units of a unified service, should accomplish more. The general managers, while responsible to their respective governments for the financial side of their respective administrations, would also function technically as the regional general managers do in an organisation such as that of the London & North Eastern Railway. Their annual reports under unification would at once become of great inter-railway interest, especially if, as would be the case, graphs and statistics relating to precisely similar functions and activities appeared in each—a desideratum long overdue. *Esprit de corps* under a unified colonial railway service would become a vital thing and its effects widespread.

It is almost certain that a great deal of valuable information contained in the general managers' annual reports (or available but not published in them) is now lost to the service as a whole, owing to a mistaken feeling that what is done on one railway, however successful its results, is of no concern to the others. A great many apposite examples could be cited. Why does one colonial railway use a locomotive boiler pressure of 250 lb. and another never exceed 180 lb.? Why does one utilise the longest locomotive valve travel obtainable and another not take advantage of this? Why the different designs of carriage and wagon stock? And why not standard principles in the design of bogies? If the L.M.S.R. has been able to standardise the basic layout of engine sheds so as to effect a uniformly prompt turn-round of locomotives, why cannot the colonial railways do the same? Then again, why does one railway operate under the departmental system and another adopt the divisional scheme? Why so many different plans for co-ordinating road and rail transport?

Turning again to the question of staff, why are there no positive avenues of promotion from a junior post on one railway to the next step up on any other one? Why should a railway officer have to rent his quarters in one colony and be provided rent free in another? And so on. This essential to unification of providing clear avenues for promotion in all European grades as between all the colonial railways must be stressed. The service cannot be regarded as one unless transfers on promotion become the

normal procedure as a matter of course as in the case of European staff who, being overseas from their home country, can be readily co-related in their active railway service.

Grouping of the Systems

It is suggested that the Crown Colony railways be formed into four groups, length of route mileage, revenue, and working expenditure, being considered together in placing any railway in any particular group. The following is the grouping now suggested:—

GROUP 1

Kenya & Uganda Railway.
Nigerian Railway.
Federated Malay States Railways.

GROUP 2

Gold Coast Railway.
Palestine Railway.
Tanganyika Railways.
Ceylon Railway.

GROUP 3

Sierra Leone Railways.
Jamaica Railway.
Trinidad Railway.
Mauritius Railway.

GROUP 4

British Guiana Railway.
Cyprus Railway.
Hong Kong Railway.

A foundation set of salary scales for European officers could be formulated somewhat on the lines indicated in the following table, which would allow of regular transfers on promotion in a form that would be remunerative and attractive to officers. The amounts are merely empirical, serving to illustrate the principle which it is the purpose of these notes to advance. Where colonial currency is not in sterling salary scales should be the equivalent of the basic sterling rates adopted.

Post	Group 1	Group 2	Group 3	Group 4
General Manager	Special	Special	Special	Special
Head of Department ..	£1,400	£1,000	£920	£500 to £550
Assistant Head of Dept.	£1,100	£750 to £920	£600	
District Officers	£1,000			
Assistant Officers—				
Grade I ..	£750 to £920	£475 to £720	£475	£450
Grade II ..	£500 to £720			
Chief Inspectors	£600	£500	—	—
Inspectors and foremen—				
Grade I	£500	£450	£360	£360
Grade II	£400	£360		

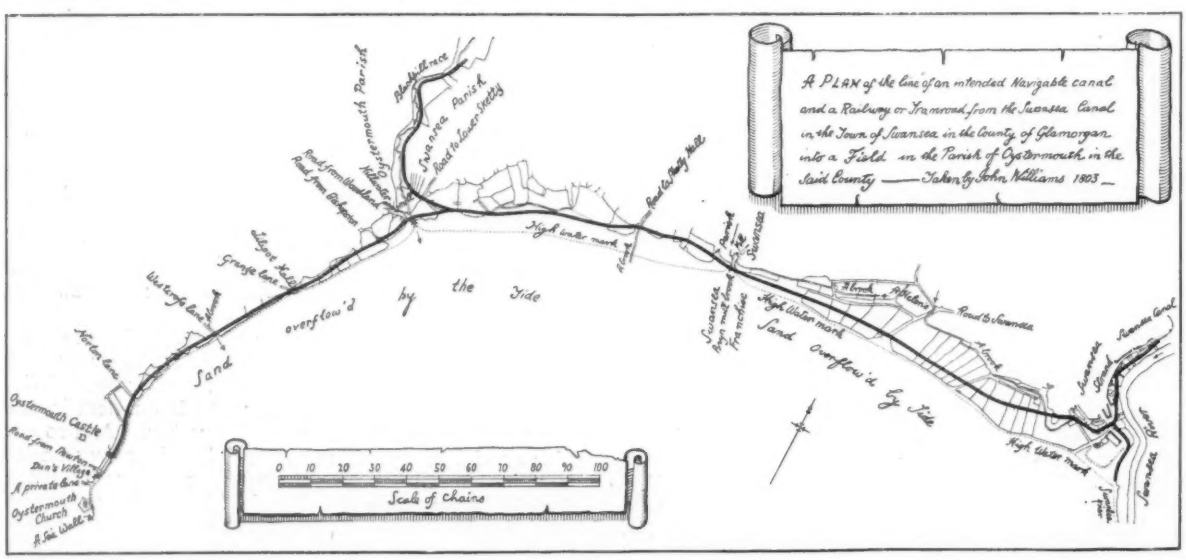
These notes contain the germ of a forward scheme. Assuming its acceptance in principle, it is only one step further to include unification of Crown Colony port and marine services, utilising the same basic salary scales as for the railways and similarly working towards standardised practice and regular transfers on promotion. The service as a whole would then become known as Colonial Transport Services, adding the name of the colony and the section (railway, port, marine, aviation, and the like). The letters "C.T.S." would become as well known as the familiar British L.M.S.R.

So much for that part of unification relating to staff. As regards the technical side, the advantages of standardisation have already been referred to above and are besides too well known to require elaboration here. The present independent status of the colonial railways and other sections of transport is clearly unsatisfactory. It has led in the past to periodical commissions being sent out from the Colonial Office. It is suggested that under unification no such radical measure would ever again be necessary.

Early Plan of the Swansea & Mumbles Railway

The oldest public railway to have survived as an independent undertaking is the line from Swansea to Oystermouth, which was incorporated as the Oystermouth Railway or Tramroad Company by Act of June 29, 1804. By courtesy of Mr. J. G. Death, Secretary of the South Wales Transport Co. Ltd. (the present lessee of the line), we were recently afforded the opportunity of seeing a copy of the original plan. This was drawn to a scale of "8 chains or 176 yards to an inch," and our reproduction below is a faithful copy, excepting for alterations in the size of lettering and the necessary modification in the scale.

The line was opened about 1807 with horse traction, and as fare-paying passengers were conveyed regularly as early as 1811 it can claim to be the first passenger railway. Steam traction was introduced on August 17, 1877, and electric traction on March 2, 1929. Since 1898 the line has extended from Swansea to Mumbles.

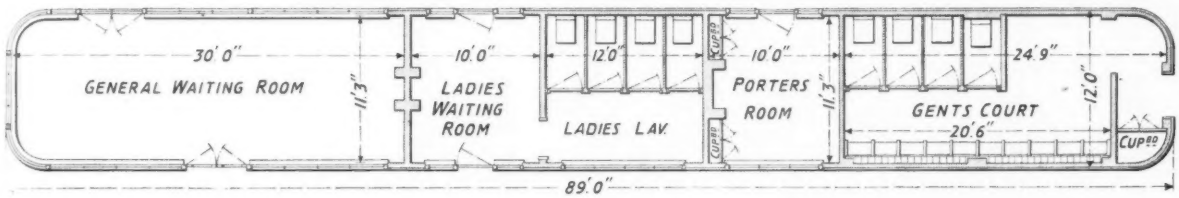

A PLAN of the Line of an intended Navigable canal and a Railway or Tramroad from the Swansea Canal in the Town of Swansea in the County of Glamorgan into a Field in the Parish of Oystermouth in the said County —— Taken by John Williams 1803 —
Oystermouth Parish
Swansea Parish
Road to Lower Strelly
Road from Oystermouth
Road from Cockett
Road to Bury Mill
High water mark
Lighthouse
Swansea Bridge
Road to Swansea
Swansea Canal
Grange Lane
Lighthouse
overflow'd by the Tide
Sand
Oystermouth Castle
Road from Morriston
Dan's Valley
A private Lane
Oystermouth Church
A Sea Wall
Scale of chains
0 10 20 30 40 50 60 70 80 90 100

NEW STATIONS AT SURBITON AND RICHMOND, SOUTHERN RAILWAY

A brief description of two notable reconstructed stations

IN his speech at the annual meeting of the Southern Railway shareholders, February 24, the Chairman, Mr. Holland-Martin, referred to the construction of new, and the remodelling of old stations to bring them abreast of the rapidly developing traffic on the system. "In our new stations, such as Surbiton and Richmond," he said, "we have endeavoured to provide cheerful, clean, businesslike structures, capable of dealing expeditiously with our ever-increasing traffic with comfort to the passenger, for we find that improved stations bring increased revenue. We are well on the way with the work of remodelling Woking, Templecombe, Swanage, and other stations. Twickenham is shortly to be reconstructed, as are Horsham, Littlehampton, and Chichester."

We have recently had the opportunity of visiting the new stations at Surbiton and Richmond and can confirm the truth of Mr. Holland-Martin's description of them.



Typical platform building at reconstructed Southern Railway stations

The illustrations and drawings accompanying this article will enable our readers to get an idea for themselves of the attractive and efficient arrangements that have been provided.

Surbiton

The old station at Surbiton had latterly become very much overtaxed, as may be gathered from the fact that, whereas the numbers of ordinary and season tickets issued there in the year 1913, immediately prior to the introduction of electrification, were 700,477 and 19,320 respectively, in 1937 they were 1,048,981 and 44,553.

As it existed two years ago Surbiton station had up and down local platforms and an island platform for up and down main line trains. The station and platform buildings were cramped and had become dingy; the goods yard, which was on the up side, had become congested, and the alignment of the tracks through the station called for improvement in view of the tendency to acceleration of trains. As will be seen from the layout plan of the new station, practically every trace of the old station has been swept away. There is considerable interchange of passengers between fast and slow trains at Surbiton, so the new arrangements were planned to minimise the occasions on which this involves crossing the footbridge from platform to platform. Two new island platforms, each 800 ft. long, have been built, and as all up trains now depart from the northern platform, London passengers need no longer wait to consult the indicator as in the past. The alignment of the tracks has been greatly improved, and an additional down line has been provided by means of which a down fast train can overtake one that has preceded it to stop at Surbiton station. New station buildings, including spacious booking halls, ticket offices, waiting rooms, parcels offices, and on the up side an inquiry office, have been provided on each side of the line and are connected by an ample double-decked reinforced concrete footbridge giving access to the platforms. The lower deck is for passengers, and above it, and reached by four large lifts, is the parcels and luggage deck. Alongside this footbridge and forming part of the structure, though completely partitioned off from the passenger side, is a through way for pedestrians from one side of the line to the other. Ample station approaches are provided on each side of the line, together with car parks. On the platforms are buildings containing waiting rooms, lavatories, &c. The whole station is calculated to attract, and is altogether a notable engineering and architectural achievement.

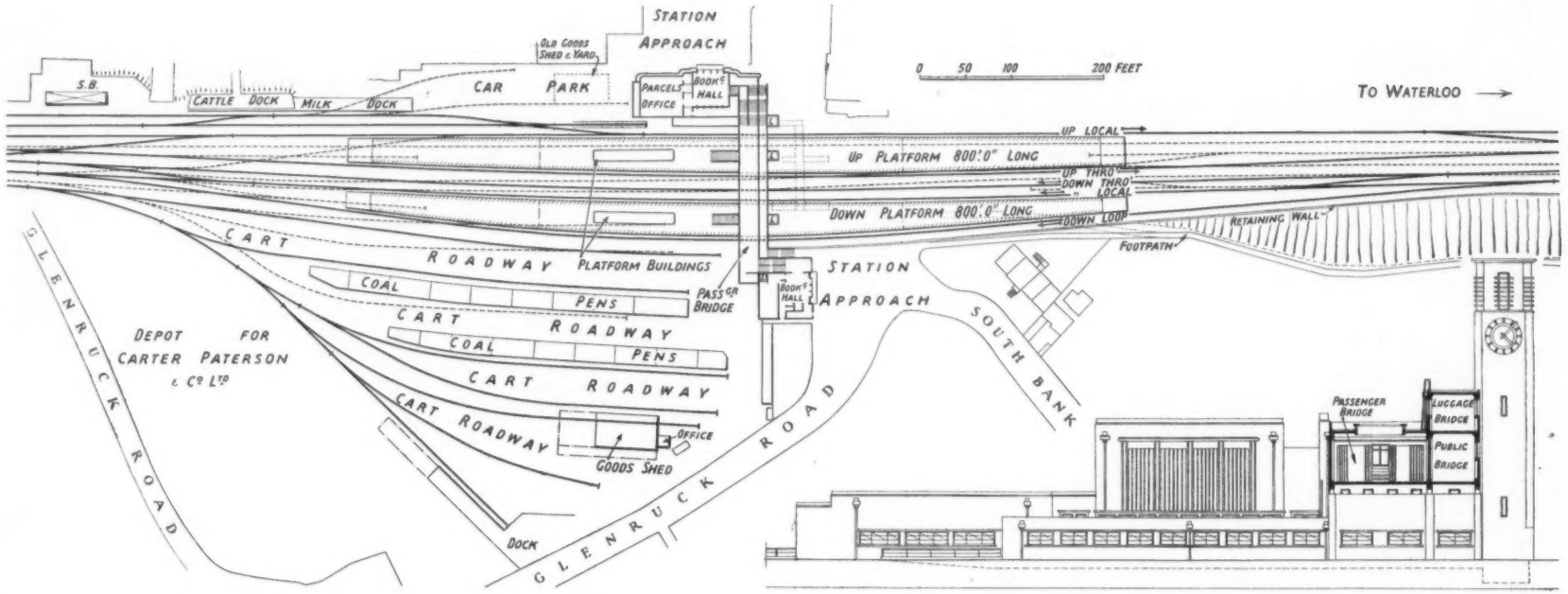
Among the minor, though from the passenger's point of view, important details, may be mentioned the attractive arrangement of advertisements, the large map of the Southern Railway displayed in the up side booking hall, and the extremely practical timetable display boards, grouped one in each booking hall on hinged boards which enable passengers to consult the timetables of any part of the system with equal facility.

The old goods yard has been swept away and its place taken by an ample car park on the up side; an entirely new goods yard is provided on the down side. A standard goods shed with goods office has been installed, capable of future extension if necessary. There are also a crane and a dock, and coal bins. Broad and ample cart roadways separate the sidings. There is a total accommodation in the new goods yard on the down side for 300 wagons.

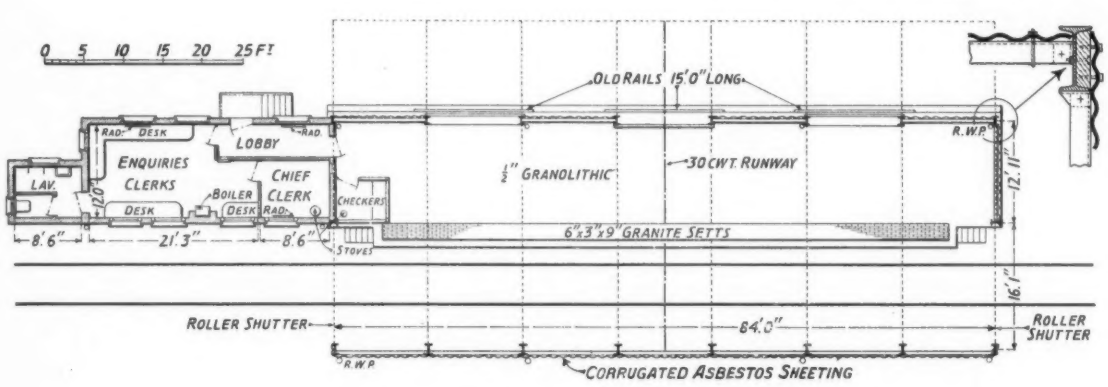
On the up side there are a cattle dock and a milk dock, together with the necessary siding accommodation. All the minor buildings, such as the lamp room, stores and coal shed, platelayers' and linesmen's huts have been renewed to be in keeping with the general up-to-date aspect of the station. Further, the new signal box opened in June, 1936, in connection with the extension of colour-light signalling to Hampton Court junction completes the picture.

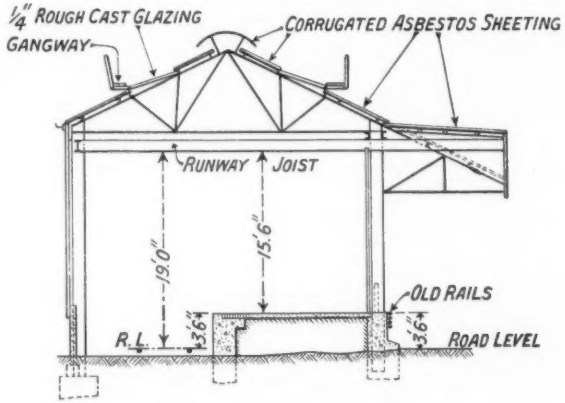
Some of the engineering work entailed has been heavy. To accommodate the new down local line a retaining wall had to be built at the London end of the station. The diversion of the footpath adjacent to the line on the down side included the construction of reinforced concrete poster display hoardings and similar hoardings have also been provided on the up side of the line. The scattered arrangement of the various offices made any extensive scheme of central heating impracticable, though a limited use is made of the system on the up side, where the usual

XUM

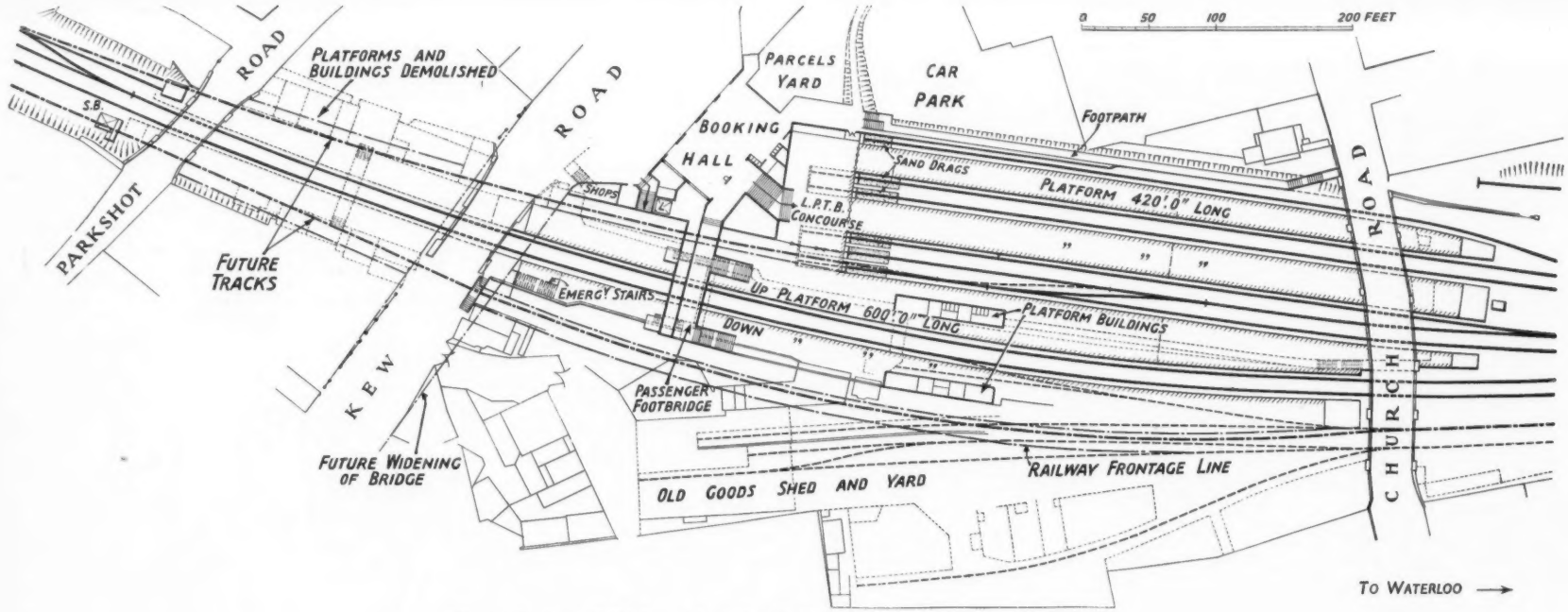


General plan of Surbiton station and goods yard (old layout indicated by dotted lines). Inset, elevation of back of up side building and section through foot and luggage bridge

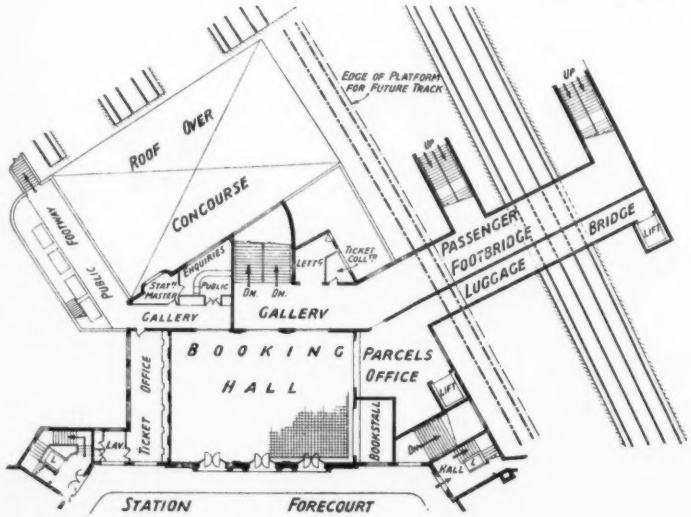




A typical standard goods shed of the type erected at Surbiton and Richmond. This particular example is that at Mitcham

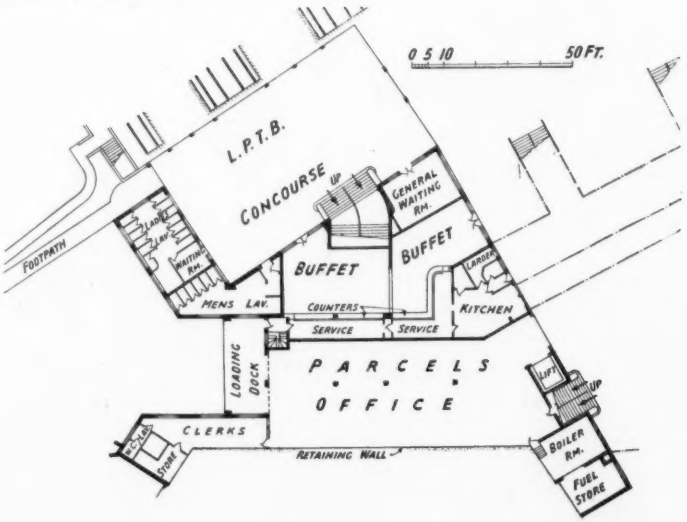


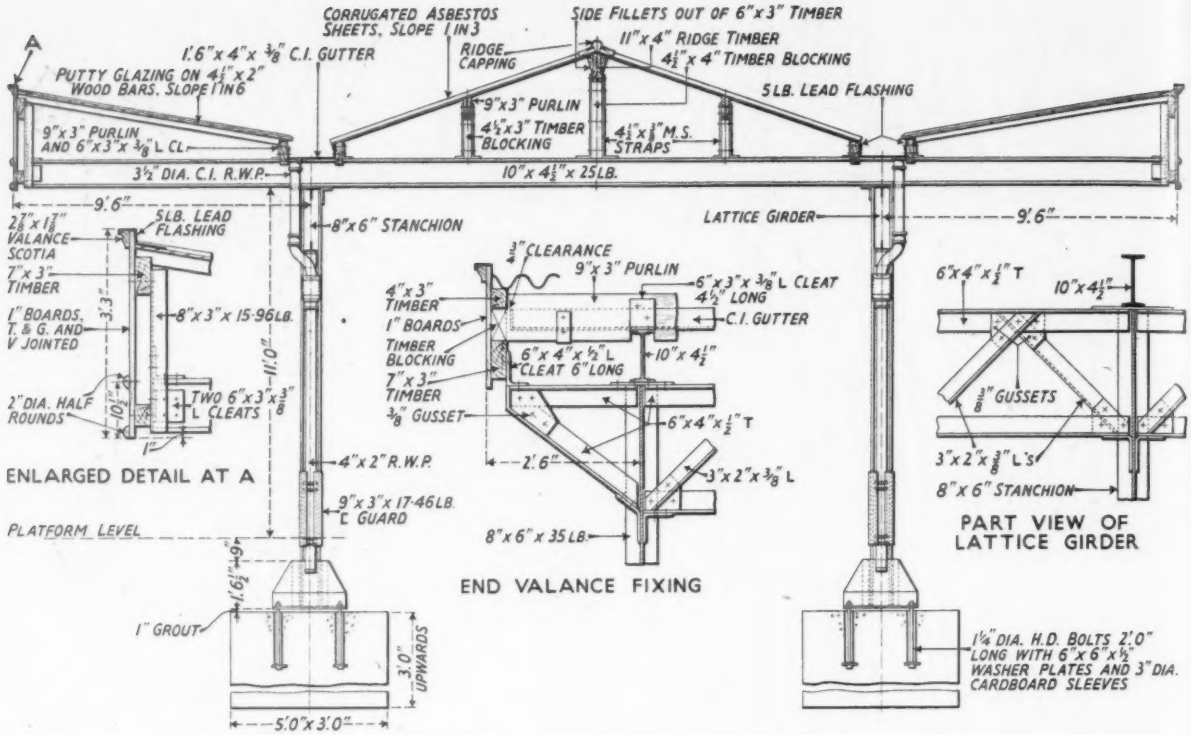
General plan of Richmond station (old layout indicated by dotted lines)



Left: Arrangement of booking hall, foot and luggage bridge and concourse

Right: Parcels office, buffets, &c., below booking hall floor, Richmond station





Typical island platform roofing at reconstructed Southern Railway stations

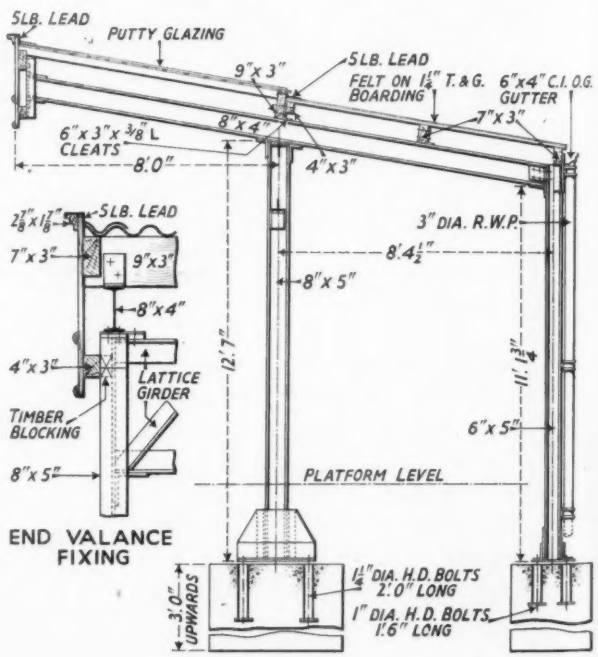
arrangement of radiators supplied from a central boiler in the basement has been installed. The waiting rooms on the platforms derive warmth from slow-combustion stoves. Effective lighting has been a special feature, as may be gathered from one of our illustrations which shows the up side booking hall at night time.

Many of the constructional details of the station building are of standard types; the platform walls for example are all of pre-cast concrete manufactured at the company's depot at Exmouth Junction. The platform roofs are also of a type which has been generally used, and has the excellent feature that the glazing is so arranged that passengers in trains drawn up at the platforms obtain the maximum of light. The goods shed is of standard type, modified to suit the particular circumstances. The cart roadways in the goods yard consist of 3 in. of asphalt on a hardcore base and curbs made of old rail are used to edge the roadways against the sidings. A complete and ample drainage system has been laid down to drain not only the goods yard and other roadways, but the whole of the permanent way through the station.

Further details that may be mentioned are the attractive ticket collectors' boxes at each end of the footbridge, beside the bronze folding doorways through which passengers gain access to the platforms. The glass front of the booking office gives an impression of spaciousness in keeping with the lofty booking hall with its high vertical windows. An imposing clock tower has been erected over one of the luggage lift wells. The structure of the booking halls is of reinforced concrete finished in white and with the words "Southern Railway" in imposing gold letters upon the fronts.

Richmond

Richmond is a joint station catering for the terminal traffic of the London Passenger Transport Board and the London Midland & Scottish electric trains, as well as for the through trains on the Windsor line of the Southern Railway. The platforms accommodating the former remain substantially as before, except for their shortening at the west end to provide room for a concourse and their



Typical side platform roof

Aerial view of Richmond station showing the new buildings, footbridge, and car park, and the extended platforms. The old goods yard is seen on the right

lengthening at the opposite end. The Southern Railway platforms have been extended to a length of 600 ft. each towards the east end, and the old restricted platforms, which formerly extended westwards under Kew Road bridge, have been abolished. The old station buildings and the footbridge west of Kew Road have also been swept away, and a spacious new combined booking hall and offices have been built in the form of a steel-framed brick-filled and stonefaced structure to the east of Kew Road, as shown on our layout plan. From this booking hall access is gained by a broad flight of stairways to the concourse, whence the trains of the L.P.T.B. and the L.M.S.R. are reached. Directly from the booking hall also there leads a reinforced concrete passenger footbridge with flights of stairs to both up and down Southern platforms. Partitioned off from the passenger part of the bridge but forming part of the same structure is a luggage footbridge having lifts to connect with the platforms and parcels office on the up side, which is situated under the booking hall. An emergency flight of stairs from the west end of the up platform direct to the forecourt has also been provided.

As at Surbiton the old goods yard, which was situated on the down side of the station, has been abolished and a new yard provided to the east of the station on the up side with accommodation for about 90 wagons. The five-ton gantry crane from the old yard has been re-erected in the new. Provision has thereby been made for a future widening to provide an additional down line, which would convert the down platform into an island. Similarly the up platform could be converted into an island by the provision of an additional up line into the station, as indicated on the layout plan.

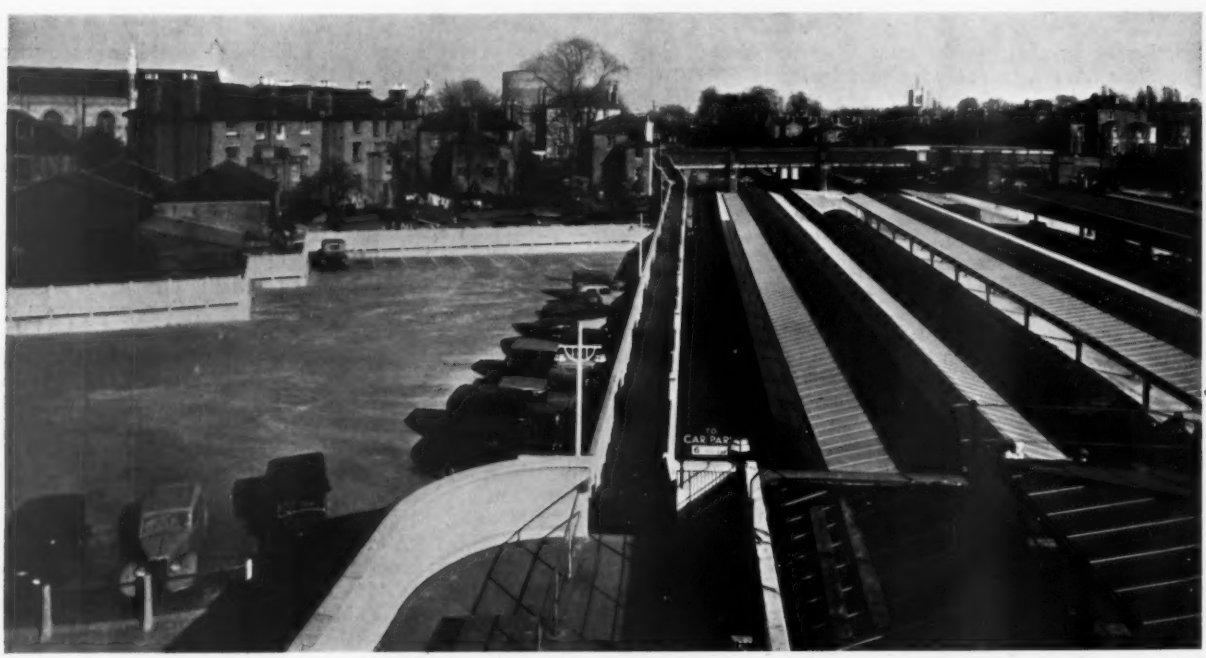
Many of the features of the new stations at Surbiton and Richmond are alike. The platform buildings for example are similar, and the ticket office also has a plate glass partition between it and the booking hall. The furniture in the booking office is all in hard wood and the ticket racks are movable. A feature of the booking office at Richmond is the provision of microphones into which the booking clerks speak so that passengers can hear them distinctly. Above the booking hall the building has been extended by two floors available for letting, and sites for shops have been provided as wings on each side of the main building. The alterations at this station have also enabled a very large area of valuable property to be made available for development. On one side of the approach road to the parcels dock is a large car park on part of which was formerly situated the stationmaster's house, now abolished. The footpath between Church Road and Kew Road has been diverted and enclosed within reinforced concrete walls.

A special feature of Richmond station is a very attractive refreshment room at platform level beneath the booking hall. This is divided into two sections separating the Southern from the L.M.S.R. and L.P.T.B. platforms. A central heating plant is provided adjacent to the parcels office for warming the whole building.

Lighting Arrangements

Not the least notable feature of these new stations is the lighting arrangements, which have the effect not only

Main buildings and entrance. The upper floors are available for letting



General view of car park, diverted footpath, and platforms

THE RECONSTRUCTED STATION AT

Interior of booking hall, showing the glazed ticket office

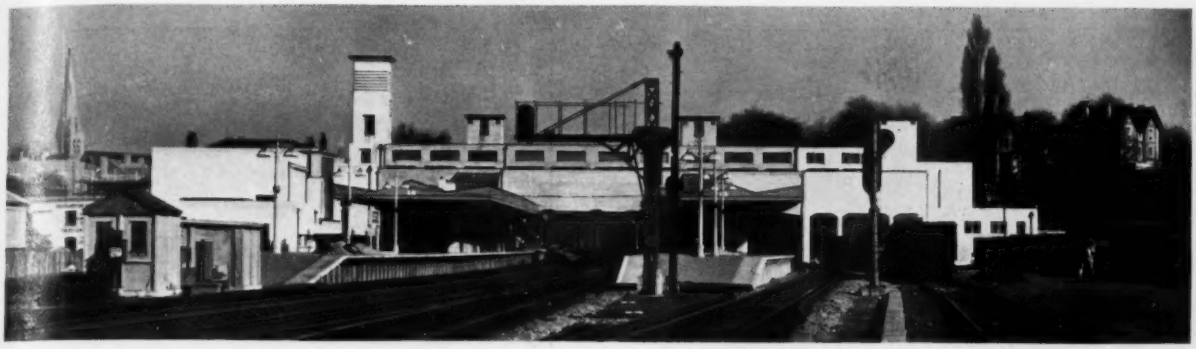
The attractive buffet with its pleasant lighting and furniture

RICHMOND, SOUTHERN RAILWAY

XUM

Forecourt and frontage, up side, showing the striking features of the clock tower and main entrance. The parcels office is on the right, and stairway to public footbridge on the left

Aerial view, looking towards the west, of Surbiton station and goods yard, with Carter Paterson & Company's depot on the left



General view of platforms and footbridge, showing extensive use of reinforced concrete, and the colour-light signalling

View down the line from the footbridge. Goods yard to left ; new signal box to right

Looking towards London from the footbridge. The good track alignment will be noticed, as well as such features as the concrete platform walling, lamp posts, and advertisement hoardings

SURBITON, SOUTHERN RAILWAY

Interior of Surbiton main booking hall

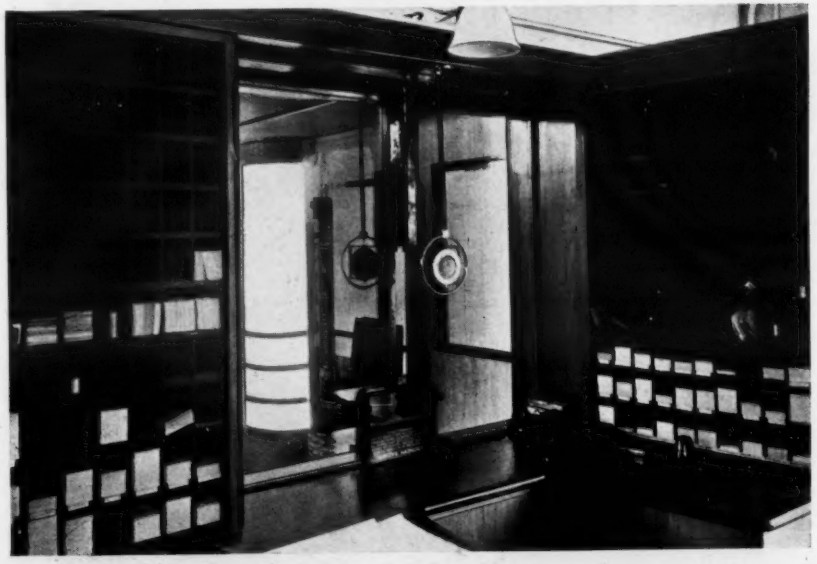
Up platform at Surbiton showing waiting rooms, &c.

Interior of booking hall at night, Surbiton

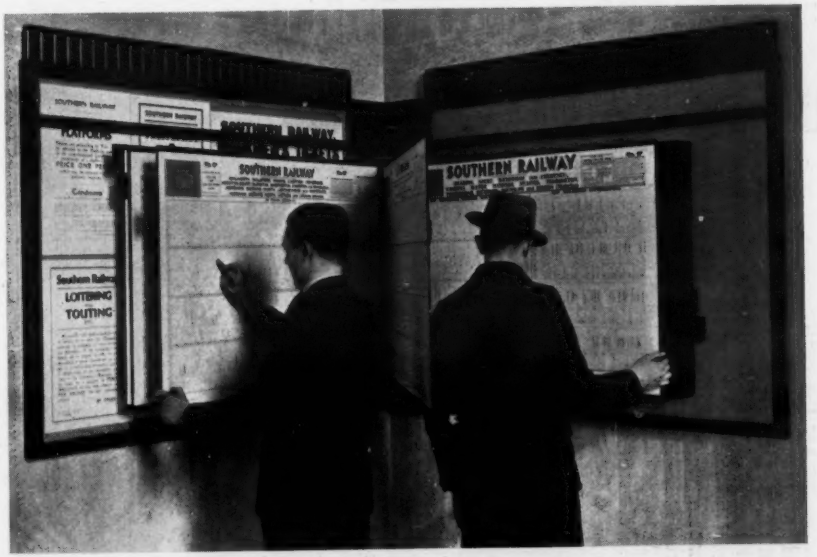
Interior of platform waiting room, Surbiton

Gateways and ticket collector's booth on footbridge at Surbiton. Note the neat advertisement display

Parcels office at Surbiton. The loading bank for road vans is beyond the rolling shutters



Microphone for booking clerk in ticket office at Richmond



Swivelling timetable display boards at Surbiton

TYPICAL VIEWS AT THE NEW SURBITON AND RICHMOND STATIONS, SOUTHERN RAILWAY

of illuminating for the purely practical purpose of enabling passengers to find their way conveniently and to identify the station on arrival by train without difficulty, but also to attract by their brightness and general air of prosperous cheerfulness. The platforms are equipped with the hexagonal opal glass reflectors which are becoming standard for the modernised stations on the Southern Railway. On the footbridges, where concrete construction would have made it somewhat difficult to get effective lighting with ordinary equipment, use has been made of prismatic glass bulkhead fittings, particularly effective with panelled sides. At the top of the staircases leading to the platforms at Richmond, and in the portion of corridor with a rather low ceiling, architectural tubular lamps have been fixed which besides giving useful illumination help to throw into relief the general lines of the design. A notable feature at Richmond is the canopy which runs round the whole of the inside wall of the booking hall. The underside of this canopy is fitted with prismatic glass plates of Holophane construction so as to give a continuous band of diffused light all round the walls below the canopy where special notices are exhibited and business is transacted at ticket windows, collectors' gates, and so on.

Old ornamental cast-iron platform roofing at Richmond renovated

In addition, there is general diffused lighting in the booking hall from ceiling fittings, some of which have been specially designed to reflect a high proportion on to large advertisement sites on the walls. The ticket office has an illuminated device for indicating which window is in use and the control of the lighting is automatic so that when the slide of the window is open the word " Tickets " is lighted up. The indication is switched off when the slide is closed.

The booking hall on the up side at Surbiton owing to its exceptional architectural treatment required of necessity a correspondingly unusual treatment in lighting. The " cathedral " effect of the high vaulted roof and tall windows on opposite sides of the main hall has been emphasised at night by the use of fittings in the form of brackets attached closely to the side walls, which give effective indirect light. These indirect reflectors are of shaped metal each enclosing a 500-watt lamp. In the lower part of the fitting there is a luminous glass band which greatly enhances the general appearance of the fittings as well as giving a feature which avoids the monotony of purely indirect lighting. Concealed architectural tubular lamps are used over each ticket window.

The following is a list of the main contractors for the two stations, which were designed and built under the supervision of Mr. George Ellson, Chief Engineer of the Southern Railway, to whom we are indebted for facilities to describe and illustrate the works. The construction of platforms, retaining walls, earthworks, drainage, and a large part of the foundation works, was carried out departmentally at both stations.

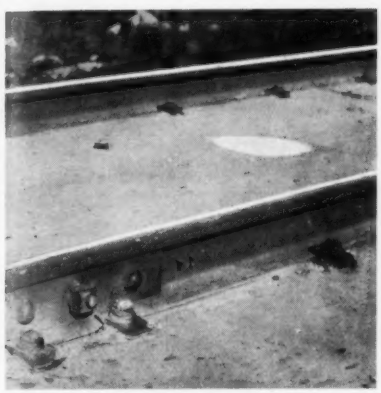
The new signal box at Surbiton, Southern Railway

SURBITON	
Reinforced concrete buildings on both sides of the line	F. G. Minter Limited, Ferry Works, Putney, S.W.15.
Buildings on island platforms	Tersons (Carter, Paterson & Co. Ltd.), 128, Goswell Road, E.C.1.
Reinforced concrete passenger and luggage footbridge	Christiani & Nielsen Limited, Romney House, S.W.1.
Steelwork for platform roofing	The Tees Side Bridge and Engineering Works Limited.
Steelwork for goods shed	E. C. & J. Keay Limited, Birmingham.
Asphalt roads in goods yard	G. Wimpey & Co. Ltd., 27, The Grove, W.6.
RICHMOND	
Main station building, reinforced concrete, passenger and luggage bridge	F. G. Minter Limited.
Steel framework for main building	E. C. & J. Keay Limited.
Steelwork for platform roofing	E. C. & J. Keay Limited.
Steelwork for roofing over concourse and goods shed	The Butterley Co. Ltd., Derby.
Platform buildings ..	Tersons.
Asphalt roads in goods yard	Modern Asphalt Pavements Limited, Larkfield, Kent.

DERAILMENT ON AMERICAN CONCRETE TRACK

The U.S.A. Bureau of Safety Inquiry attributed the accident to failure of the rail fastenings

ON December 17 last a passenger train travelling at about 50 m.p.h. was derailed on the experimental concrete track of the Pere Marquette Railway at Beech, about 16 miles west of Detroit, causing injuries to 33 persons. This concrete track was constructed in two units, the first, about a quarter of a mile long, in 1926, consisting of slabs of rectangular cross section; and the second, completed about three years later over a distance of 400 ft., of inverted T-beam slab construction. Both sections were described with drawings in *The Railway Engineer* of February, 1932 (pages 70 and 71).*



The type of rail fastening that failed

The derailment occurred on the older section, in which the 90-lb. flat-bottom rails are held in place by clips at intervals of 27 in. bolted to steel stirrups embedded in the concrete. The stirrups are rigidly attached to the top cords of the steel trusses comprising the essential element of the longitudinal reinforcement of the slab. The rails are laid vertically on insulating fibre and, because of difficulty with battering at the rail ends, they were continuously welded to eliminate joints in 1933 and 1935. The entire length of concrete track is on a low embankment from 3 ft. to 6 ft. high.

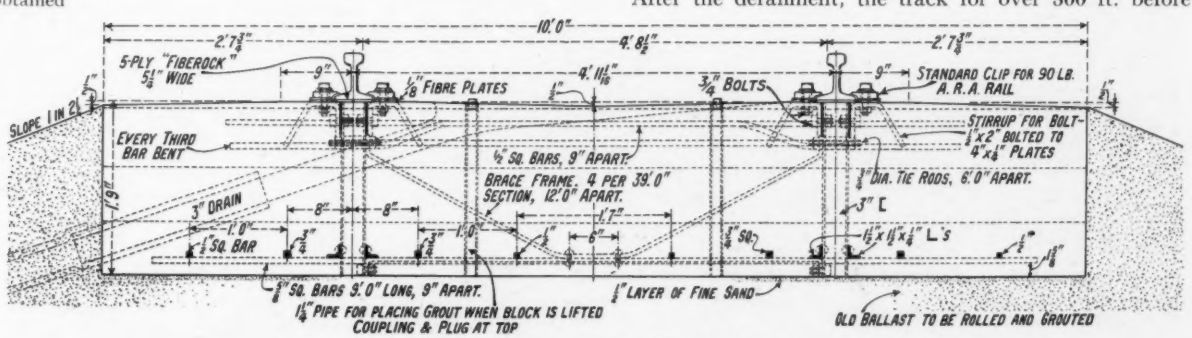
The point of initial derailment was 731 ft. from the east end of the concrete slab, and it was found afterwards that 261 clip bolts had been broken off on the outer side of the north rail beyond the point of initial derailment, allowing the rail to be pushed outward. The concrete roadbed was covered with 2 in. of ice at the time of the accident.

The section foreman stated, during the inquiry by the Bureau of Safety of the Interstate Commerce Commission, that it had been necessary to renew clip bolts nearly every day, sometimes as many as eight or ten at a time, and the trouble was accentuated in winter; and Mr. W. Meier, Track Supervisor, said that there had been trouble due to the breakage of bolts from the time the concrete track was built. A rigid inspection had, however, been maintained, and he estimated the number of broken bolts at from eight to fifteen a month. Mr. R. A. Morrison, Divisional Engineer, said that the movement of vehicles on the vertical rails tended to force the rails apart, and that the gauge was slightly wide but uniform at about 4 ft. 9 in. He added that no trouble had been experienced in the maintenance of the concrete slab; there had been no settlement or movement of the slab nor any deterioration in the concrete.

Concrete track at Beech, Michigan. The derailment occurred on the older type seen in the background

After the derailment, the track for over 500 ft. before

* The photographs now reproduced are from the *Railway Age*, of February 19, from which the particulars here recounted are also obtained

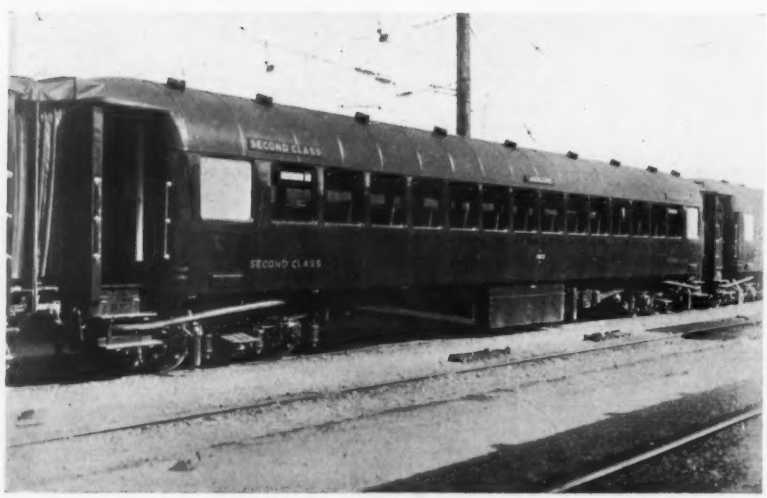


Cross section of the older form of concrete track on which the derailment occurred

the initial point of derailment was found to vary in gauge from 4 ft. 9 in. to 4 ft. 10½ in., and in level from ⅛ in. high to ⅜ in. low. In Mr. Morrison's opinion the wide gauge before the point of derailment had developed under either the derailed train or the train immediately preceding it. He suggested that the manner in which the north rail was bent round the last bolt that remained in place indicated that some abnormal stress was applied. He also thought that a contributory cause might have been the swelling of the insulating materials due to their having become saturated and then frozen. He added that from the beginning of 1937 to the time of derailment 410 anchor bolts had been replaced on the concrete roadbed. The number replaced monthly ranged from zero in September to 150 in February.

The report of the Bureau of Safety attributed the derailment to the "spreading of the track, apparently due to failure of rail fastenings used on track of special construction."

(*See editorial comment on page* 915)



Above: An interesting early view of Bridgend station taken apparently at the time the line was built. This section of the South Wales Railway was opened on June 18, 1850, and was, of course, a broad-gauge line. The photograph was sent by Mr. G. P. Rees, Traffic Department, Ogmore Vale, to the "Great Western Railway Magazine," and we reproduce it by courtesy of the Editor

Left: The latest type of second class bogie car for main trunk traffic on the New Zealand Government Railways

RAILWAY NEWS SECTION

PERSONAL

Mr. Gilbert S. Szlumper, C.B.E., General Manager of the Southern Railway, which operates six steamship routes between England and France, has been created an Officer of the Legion of Honour by the President of the French Republic.

Mr. Leslie W. R. Robertson, M.I.Mech.E., M.I.Loco.E., has been elected a Director of W. G. Bagnall Limited, locomotive builder & railway engineer, Stafford.

Sir Malcolm Hogg has been elected a Director of the Rohilkund & Kumaon Railway Company in place of the late Sir Leonard L. Cohen, who, as recorded in our issue of April 22, died on April 10 this year.

Mr. John Aiton Bell, Agent of the East Indian Railway, has been transferred from the class of Associate Member to that of full Member of the Institution of Civil Engineers.

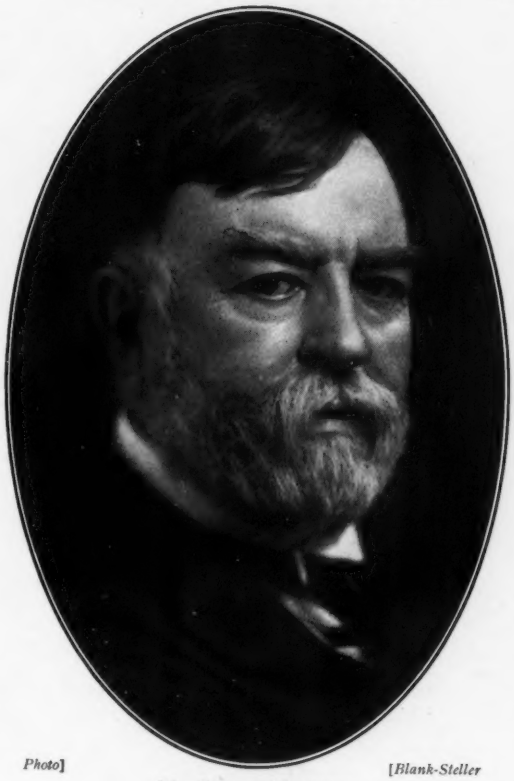
Mr. E. Huskisson, Manager of Thos. Cook & Son Ltd., has been made a Knight in the First Class of the Order of St. Olaf by King Haakon of Norway. The honour is in recognition of Mr. Huskisson's valuable services to Norwegian tourist traffic in the course of many years.

Mr. H. S. Richardson has been appointed Passenger Agent for the Canadian Pacific at Antwerp, succeeding the late Mr. H. V. Gard, whose death was recorded in our issue of April 29. Mr. Richardson was formerly Passenger Agent for the company at Hamburg. He will be succeeded at Hamburg by Mr. L. P. Hodson of the company's London office passenger staff.

We regret to learn of the sudden death at Caversham, Reading, of Sir Montagu de Pomeroy Webb, on May 5; he was 68 years of age. Sir Montagu was one of the best known men in Sind, and, in co-operation with the North Western Railway, was closely connected with the rapid growth and development of the port of Karachi. He was also founder of the Sind Light Railways and other transport concerns.

Mr. A. L. Sauviat, Assistant Supervisor of Exhibitions, Canadian National Railways, has arrived on a visit to Glasgow.

Mr. Leonor Fresnel Loree, whose retirement at the age of 80 from the Presidency of the Delaware & Hudson Railroad we recorded in our issue of April 29, was born in Fulton City, Ill., U.S.A., on April 23, 1858. He was educated at Rutgers University, where he took his degree of Civil Engineer, and entered railway service in 1877 as an assistant in the Engineering Department of the Pennsylvania Railroad. Two years later he served as a Transitman with the Engineer Corps, U S. Army, and in 1881 joined the Mexican National Railway for preliminary survey work between the Rio Grande river and Santillo. Mr. Loree in 1883 was appointed Assistant Engineer, Chicago Division, Pennsylvania Lines, West, and in 1884 became Maintenance of Way Engineer on various divisions of the same system. He was appointed Divisional Superintendent of the Cleveland & Pittsburgh Division in 1889. In 1896, at the age of 38, he was appointed General Manager of the Pennsylvania Railroad, and in 1901 became fourth Vice-President. Called, also, to the Presidency of the Baltimore & Ohio Railroad in the latter year, he held the post for four years, until appointed President of the Rock Island Company, and Chairman of the Executive Committees of the Chicago, Rock Island & Pacific, and the St. Louis—San Francisco Railways. After serving in this capacity for nine months, Mr. Loree became Chairman of the Kansas City Southern Railway, which post he relinquished only last year. Mr. Loree was appointed President of the Delaware & Hudson Railroad, and President of the Board of Managers, in 1907. Between 1926 and 1928 he was Chairman of the Missouri—Kansas—Texas Railroad, and at various times held directorships with the Erie, the National Railways of Mexico, the New York, Ontario & Western, and the Wheeling & Lake Erie systems. From 1899-1901 Mr. Loree was President of the American Railway Association, and in 1913 served as Chairman, Eastern Group, Presidents' Conference Committee on Valuation. He was a member or chairman of several boards which during the Great War co-operated with the U.S.A. Government on transport matters, and also served on the War Labour Board. Mr. Loree is the author of "Railroad Freight Transportation," a classic in the bibliography of the industry covering a much wider field than its title suggests, and revealing in the wealth of allusion with which its arguments are supported the wide knowledge and penetration of thought which Mr. Loree brought to bear upon his activities. His career is further referred to in an editorial note on page 913. As an operating officer, Mr. Loree invented the upper-quadrant signal, was responsible for development of the lap passing siding, and organised the first railway police unit in the U.S.A.



Photo] [Blank-Steller

Mr. Leonor F. Loree

President of the Delaware & Hudson Railroad, 1907-38; past General Manager of the Pennsylvania, President of two other important systems, and Chairman of another

Sir Guthrie Russell, Chief Commissioner of Railways in India, proceeded on leave on April 14, and Sir Leonard Wilson, Agent of the Great Indian Peninsula Railway, has been appointed to act as Chief Commissioner from that date.

Sir Edward Beatty was re-elected Chairman and President of the Canadian Pacific Railway on May 4. At the same meeting Mr. D. C. Coleman was elected Vice-President; and Sir Edward Beatty, Mr. D. C. Coleman, Sir Herbert S. Holt, Mr. W. N.

Tilley, K.C., Sir Charles Gordon, and Mr. Ross H. McMaster, were appointed to the Executive Committee for the ensuing year.

M. Hans Etter, whose appointment as President of the General Management of the Swiss Federal Railways with effect from March 1 this year was recorded in our issue of February 4, was born in 1874, and entered railway service in 1899. After a period as Constructional Engineer to the Bernese subsidised railways, he joined the Gotthard Railway in 1902, and in 1910 was appointed Engineer (Permanent way) at Arth-Goldau. M. Etter was transferred to the Federal Railways in 1914 as Assistant to the Chief Permanent Way Engineer, becoming Chief Permanent Way Engineer himself, with headquarters at Berne, in 1917. In 1922 M. Etter was appointed Manager of the former Fifth (Lucerne) Division. He was appointed General Manager (Working and Construction) of the railways in August, 1936, holding that position until his appointment as President of the General Management.

Diacon] ***M. Hans Etter*** [*Berne*

Appointed President of General Management, Swiss Federal Railways

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Mr. P. R. T. Wills, who, as announced in our issue of May 6, has succeeded Mr. C. A. Murton as Secretary to the Commissioner for Railways, Queensland, has had wide experience of administrative work in the department. Joining the service as a junior clerk in the Traffic Manager's office at Rockhampton, he was transferred to the Commissioner's office, where he rose to the position of first clerk. Later he was appointed Accountant and Chief Clerk in the Stores Branch, after which he became Officer-in-charge of Operating Statistics, Commissioner's Inspector, and Inspecting Superintendent. He was appointed General Manager in the Central Division in 1932, and held that position until taking up his present duties. Mr. Wills has conducted many special investigations for the department, and brings to his new office an extensive knowledge of railway operations in Queensland.

Mr. J. J. Newcome, whose election to the Eire Senate was recorded in our issue of April 29, entered the service of the former Midland Great Western Railway Company in 1905, and was posted to the clerical staff of the Chief Engineer's Office. Taking advantage of the courses in drawing, surveying, building construction, and allied subjects in the City of Dublin Technical Schools, he was, in 1914, transferred to the Drawing Office of the Chief Engineer's Department at Broadstone. After changes consequent on the amalgamation of the railways, he was appointed in charge of the Drawing Office of the Northern District, under Mr. J. H. Ffolliott, District Engineer. When this district was amalgamated with the Dublin District he was transferred as Draughtsman in the District Engineer's Office at Westland Row, his present position. Mr. Newcome served with the 9th Railway Construction Coy. in France in 1917, under Mr. J. M. Roberts, District Engineer (now retired). Mr. Newcome is a Governor and Honorary Secretary of the Mount Street Club for unemployed men, which was founded by Mr. P. T. Somerville-Large, District Engineer, Westland

Mr. P. R. T. Wills

Appointed Secretary to Commissioner for Railways, Queensland

Mr. J. J. Newcome

Draughtsman, Great Southern Railways, elected to the Eire Senate, 1938

Mr. J. J. C. Paterson, C.I.E.

Locomotive & Carriage Superintendent, B.B. & C.I.R., 1928-38

Row, and includes amongst its Governors a railway director, two railway engineers, a railway draughtsman, a railway clerk and an engine driver. Mr. Newcome's nomination for the Senate was made by the Mount Street Club Society which is an auxiliary organisation founded for the purpose of supporting the Mount Street Club and extending its activities. Mr. Newcome, in his younger days, was well known in rowing circles, having been Captain and subsequently President of the Dolphin Rowing Club, Dublin. He was also a member of the Irish Amateur Rowing Union, and Vice-Chairman of the Council of the Dublin Metropolitan Regatta.

Mr. J. J. C. Paterson, C.I.E., A. M. Inst. C. E., A. M. I. Mech. E., M.I.Loco.E., who is retiring from the position of Locomotive and Carriage Superintendent, Bombay, Baroda & Central India Railway, underwent his early training as a premium apprentice in the locomotive shops of the former Great Northern Railway at Doncaster. When he left there to join the B.B. & C.I.R., in India, as District Locomotive and Carriage Superintendent, he was an Assistant to the then Locomotive Superintendent, Mr. Nigel Gresley (now Sir Nigel). He joined the B.B. & C.I.R. in February, 1911, and was posted as District Locomotive and Carriage Superintendent, Parel. He acted as Locomotive and Carriage Superintendent in 1922, and was promoted to Deputy Locomotive and Carriage Superintendent in 1923. When the late Mr. F. J. Page was called to the staff of the Railway Board in 1928, he succeeded him as Locomotive and Carriage Superintendent. Mr. Paterson was at various times Chairman of different committees, and sections of the I.R.C.A. and Locomotive Standards Committee, and was made a Companion of the Indian Empire in 1937. He was Chairman of the Indian & Eastern Centre of the Institution of Locomotive Engineers in 1933/34, and was a member of the committee of this centre from its inception in 1930. During his term of office as Locomotive and Carriage Superintendent, the new locomotive repair shops at Dohad were designed and built, and the work transferred to Dohad from Bombay. In 1937 Mr. Paterson designed and built the first successful air-conditioned coach to be put into regular passenger service in India.

It is with regret that we record the death at Chatsworth on May 6 of the Duke of Devonshire, at the age of 69. The Duke, who was Governor-General of Canada from 1916-21, in his early years acquired a sound knowledge of the iron and steel trade which made him a valuable member of the boards of the Barrow Hæmatite Steel Company, and of the Furness Railway. He succeeded to the dukedom in 1908. On his return from Canada he was Colonial Secretary for a year in Mr. Bonar Law's Government, and in that position was intimately involved with the preparations for the Empire Exhibition at Wembley of 1924-5.

INSTITUTE OF TRANSPORT PRESIDENT

Mr. Gilbert S. Szlumper, C.B.E., General Manager of the Southern Railway, has been offered and has accepted the presidency of the Institute of Transport for the year beginning on October 1, 1938. Mr. Szlumper, who is a Foundation Member of the institute, served as a Member of Council from 1924 to 1927, and 1929 to 1932, and from 1932 to 1935 as a Vice-President.

Mr. Eivind Heiberg, who retired from the post of General Manager of the Norwegian State Railways on May 1, had been in that position since 1924, and prior to that time was Managing Director of the Skabo Rail Waggon Works, near Oslo. At the time of his appointment, Mr. Heiberg was automatically elected to the Presidency of the management of the Norwegian Trunk Railway, and he was also a member of the committee dealing with the ferry connection between Norway and Jutland (Denmark). Mr. Heiberg was born in Oslo in 1870 and received his earliest education there. In 1890 he left the Trondheim Technical School after completion of the Machine Engineering course, and in the same year was appointed to the Technical Department of the Norwegian State Railways, where he worked for a number of years as Constructor and Departmental Engineer. In 1899 Mr. Heiberg was appointed Managing Director of the A/s Skabo Rail Waggon Works where a good chance awaited him to prove his abilities, his energy, and economic leadership. The Skabo Works at present forms one of the outstanding features in the Norwegian iron and steel industry. As a representative of this industry, Mr. Heiberg has been, for a number of years, the President of the Confederation of the Norwegian Mechanical Workshops, and later President of the Norwegian Employers' Association; beside this he has made his presence felt and distinguished himself as one of the leading men in the Norwegian Association of Industries. One of Mr. Heiberg's personal characteristics is his charm of manner and ready understanding. He has had to pilot the Norwegian railways through a very difficult period—more especially so between 1931, when the depression came, and up to last year when things began to improve—and it has indeed been a very strenuous task. The line of policy laid down by Mr. Heiberg's superior Government departments had to be followed and it was not always easy to reconcile the needs of a progressive railway system with the general spirit of saving expenses. It is fully recognised, however, that Mr. Heiberg filled his responsible position in a manner which will leave him only friends and their sincere good wishes.

We regret to record the death on May 7, at the age of 58, of Mr. William Eden Highfield, of the firm of Messrs. Highfield and Roger Smith, consulting electrical engineers. A memorial service was held at Christ Church, Victoria Street, S.W.1, on Wednesday. Mr. Highfield was a specialist in electrical machinery, especially for traction. As a Vice-President of the Institution of Electrical Engineers he performed work of outstanding value on many committees.

M. Daniel Vincent, who has been appointed President of the French Superior Transport Council in succession to the late M. Yves Le Trocquer, is a university professor, who has also had a distinguished Parliamentary career. He entered Parliament in 1906 and now represents the Department of the Nord as Senator. Eight times he has held the rank of a Cabinet Minister, and during the war, as Under-Secretary of State, he organised the French Aviation Services. M. Daniel Vincent is reported by the journal *France-Transports* as saying that he is firmly convinced of success in the great task he has undertaken.

INSTITUTION OF LOCOMOTIVE ENGINEERS

The following elections were made at a general meeting of the institution on April 27:—

Member

Mr. C. B. Kirk, District Locomotive Superintendent, Gorton, L.N.E.R.

Transfer from Associate Member to Member

Mr. T. E. Jansz, Assistant Divisional Transport Superintendent, Ceylon Government Railway, Colombo.

Associate

Mr. H. J. Mulleneux, Chief Electrical Engineer, Great Indian Peninsula Railway, Parel, Bombay.

Associate Members

Mr. A. Leslie, Officer in Charge of Workshops, R.I.A.S.C., Bannu, N.W. Frontier Province, India.

Mr. W. J. Sproson, Locomotive Superintendent, North Borneo State Railways, Jesselton, B.N.B.

Mr. H. E. A. White, Draughtsman, Great Western Railway, Swindon.

We regret to record the sudden death at Bournemouth on May 7 of Mr. Harry William Harding, formerly European Secretary of the Canadian National Railways. He was 68 years of age, well-known and highly respected in the City of London, and had retired in September, 1932, following 26 years' service with the Canadian National Railways. Mr. Harding began his business career in the Secretary's department of the former London, Brighton & South Coast Railway. He was appointed Local Secretary of the Canadian Northern Railway in London on October 1, 1906, and subse-

quently became European Secretary of the Canadian National Railways in 1919.

At the funeral on Wednesday, Mr. P. A. Clews, European Manager of the C.N.R. (who is at present in Glasgow), was represented by his Assistant, Mr. C. H. V. Winter. Other Canadian National officers who attended were Mr. A. H. Coneybeare, European Secretary, and Mr. F. G. Birch, District Traffic Agent, Southampton.

Mr. R. D. Walker, Manager and Chief Engineer, Kowloon-Canton Railway, British Section (otherwise known as the Hong Kong Government Railway), has arrived home on leave.

We regret to record the death in Dublin on April 30 of Mr. Richard Cronin, Locomotive Superintendent of the former Dublin & South-Eastern Railway, Ireland, and of its predecessor, the Dublin, Wicklow & Wexford, from 1894-1917. Mr. Cronin received his training as an apprentice at Inchicore of the Great Southern & Western Railway, becoming Principal Foreman of Erecting at Inchicore works. In 1897 he was appointed Locomotive Superintendent of the then Dublin, Wicklow & Wexford (later Dublin & South Eastern) Railway, the locomotive department of which company was at that time in charge of the Civil Engineer. Mr. Cronin was faced with the task of modernising the company's locomotive stock (which included a number of " single " tanks with 30 or 40 years' service), and its coaching equipment, then wholly composed of six-wheelers. During his 20 years as Locomotive Superintendent Mr. Cronin placed 20 new locomotives in service, thoroughly rebuilt 30 more, and introduced some modern 50-ft. steel-framed coaches. He was obliged to retire owing to ill health in 1917, but continued to take a keen interest in locomotive engineering and in his later years pursued some careful theoretical investigations into valve-gearing and fuel economy.

L.M.S.R. Appointments

The following appointments have been approved by the directors:—

Mr. F. G. Parke, Bookkeeper to the company, Chief Accountant's Office, Euston, to be Assistant to Chief Accountant, Euston.

Mr. J. Gold, Works Accountant (C. & W. A/c.), Earlestown, to be Works Accountant (C. & W. A/c.), Wolverton.

Mr. H. Bradshaw, Chief Clerk (C. & W. A/c.), Earlestown, to be Works Accountant (C. & W. A/c.), Earlestown.

Mr. H. Eccles, Chief Commercial Clerk, D.G.M.O., Warrington, to be Commercial Assistant to District Goods Manager, Warrington.

Mr. S. T. Clayton, Assistant, Office of Divisional Superintendent of Operation, Derby, to be District Locomotive Superintendent, Bank Hall.

Mr. A. R. Maxwell, Goods Agent, Ashton, to be Goods Agent, Stockport.

Mr. H. Cresswell, Goods Agent, Trafford Park, to be Goods Agent, Ashton.

Mr. C. French, Canvasser, D.G.M.O., Manchester, to be Goods Agent, Trafford Park.

Mr. H. S. McDonald, Goods Agent, Tamworth, to be Goods Agent, Nuneaton.

Mr. P. Wildgoose, Goods Agent, Radcliffe, to be Goods Agent, Burnley.

Mr. J. Crawford, Goods Agent, Kilmarnock, to be Goods Agent, Dundee West.

Mr. D. Lindsay, Goods Agent, Ardrossan, to be Goods Agent, Kilmarnock.

Mr. T. Eaglesfield, Running Shed Foreman, Crewe (North), to be Assistant District Locomotive Superintendent, Camden.

Mr. J. F. K. Davidson, Loco. Foreman, Greenock, to be Loco. Foreman, Hurlford.

Mr. J. Lamond, Running Shed Foreman, Inverness, to be Loco. Foreman, Greenock.

Mr. W. Dunsmuir, Foreman Fitter, Carlisle (Kingmoor), to be Loco. Foreman, Aberdeen.

We regret to record the sudden death at Hove on Wednesday, at the age of 76, of Lt.-Colonel Woodbine Parish, a Director of the Buenos Ayres Great Southern, Buenos Ayres Western, and Great Western of Brazil Railways, the Central Uruguay Railway of Monte Video, and other systems in South America. Colonel Woodbine Parish had devoted his life to the welfare of the South American enterprises with which he was associated, and played his part in the maintenance of cordial relations between the Argentine Republic and this country. At the time of his death he was President of the Argentine Club.

We regret to record the death on May 5, at the age of 66, of Mr. Laurence Ennis, C.M.G., O.B.E., a Director of Dorman, Long & Co. Ltd., and until a few months ago Managing Director of the company. Mr. Ennis had entire charge of the manufacture and erection of the Sydney Harbour bridge, and for his work in that connection was awarded the C.M.G. in the New Year Honours of 1933. He was born in Scotland, but went to the United States early in his life, joining the Rochester Bridge & Iron Works as Assistant Engineer in 1890. During 1902 he served as Superintendent Engineer with the Baltimore Bridge & Iron Works, but in the next year joined Dorman, Long & Co. Ltd. as Superintendent of Bridge and Constructional Works. He became Works Manager in 1905, and General Manager in 1915. From 1924 to 1932 Mr. Ennis was Resident Director in Sydney of Dorman, Long & Co. Ltd. It was during that period that the company's £4,218,000 tender for construction of the bridge was accepted by the N.S.W. Government. The bridge was opened in March, 1932. Mr. Ennis was a Member of the Institution of Civil Engineers (by which he was awarded a Telford premium), and also an M.I.Mech.E., and M.I.E. Australia. Until recently he was Vice-President of the British Iron and Steel Federation.

Indian Railway Staff Changes

Mr. H. C. Norbury, Chief Accounts Officer, G.I.P.R., has been granted 22 months' leave preparatory to retirement as from February 17, and Mr. P. Wood has been appointed to officiate in his place, as from that date. Mr. C. E. Hall has also been appointed to officiate as Deputy Chief Accounts Officer of that railway as from the same date.

Mr. R. P. Varma has been appointed to officiate as Divisional Superintendent, N.W.R., as from January 19.

Messrs. W. A. Anderson and A. N. Sud have been appointed to officiate as Deputy Chief Engineers, N.W.R., as from January 17 and 24 respectively.

Rai Bahadur A. K. Gupta, Divisional Superintendent, E.B.R., has been granted leave for three months as from March 7.

Rai Bahadur F. C. Malhan has been confirmed as Deputy Chief Accounts Officer, State Railways, as from February 2.

Mr. W. A. Anderson has been appointed Officiating Deputy Chief Engineer (M.), N.W.R.

Mr. R. V. Ramch an dani has been appointed to officiate as Deputy Controller of Railway Accounts as from February 28.

Mr. J. C. Gibson, officiating Deputy Agent, Organisation, E.I.R., has been appointed to officiate as Divisional Superintendent, as from February 21.

Mr. E. R. Fletton has been appointed to officiate as Deputy Agent, Organisation, in place of Mr. Gibson.

Mr. H. A. Joscelyne, Senior Government Inspector of Railways, Circle No. 1, has been granted 7½ months' leave as from February 26.

Mr. E. R. Casement, Divisional Superintendent, E.I.R., has been appointed to succeed Mr. Joscelyne as Senior Government Inspector, Circle No. 1.

Forthcoming Events

May 13 (*Fri.*).—Past and Present Crewe Pupils and Premiums Dinner, at the Trocadero Restaurant, Piccadilly, London, W.1, 7.15 for 7.45 p.m.

May 15 (*Sun.*).—Omnibus Society. Visit to Leicester City Transport Depot.

May 16 (*Mon.*).—Committee on the Status of the Engineer, at Caxton Hall, Caxton Street, London, S.W.1, 7 p.m. Meeting of Engineers. Introduction of Chairman of Meeting, Sir John Thornycroft, K.B.E. Presentation of Committee's Report.

May 18–21.—Institute of Transport, at North British Station Hotel, Edinburgh. Annual Congress.

XUM

Ancillary Businesses of the British Railways in 1937

IV—Steamboats

Not since 1929 has the steamboat business of the British railways afforded such a satisfactory result as that of 1937. The total gross receipts of the four companies amounted to £4,187,598, an increase of £460,453 compared with 1936, and the resultant profit of £710,807 was £278,796, or 65 per cent., greater than in the previous year. This was only £42,338 less than the record profit secured in 1929. The figures for the four groups are summarised in the following table: —

Company	Receipts		Expenditure		Surplus		Per cent. of surplus to gross receipts	
	1937	1936	1937	1936	1937	1936	1937	1936
	£	£	£	£	£	£		
G.W.R....	339,282	318,651	319,331	301,056	19,951	17,595	5·9	5·5
L.N.E.R.	874,507	815,599	825,480	794,881	49,027	20,718	5·7	2·5
L.M.S.R.	1,508,577	1,468,095	1,204,290	1,175,456	304,287	292,639	20·2	19·9
S.R. ...	1,465,232	1,124,800	1,127,690	1,023,741	337,542	101,059	23·0	9·0

The G.W.R. steamboat business is comparatively small and is confined to the Fishguard—Rosslare, Fishguard—Waterford, and Weymouth—Channel Islands routes. Gross receipts increased by £20,631 chiefly in consequence of an all-round improvement in passenger traffic, but working expenses rose by £44,092, principally on account of repairs. The sum transferred to renewal fund was £25,817 less than in 1936, however, with the result that the net profit of £19,951 was £2,356 greater than in the previous year.

The L.N.E.R. business showed a substantial improvement last year. Gross receipts advanced by £58,908, of which £32,000 was due to passengers and £26,000 to merchandise. Working expenses increased by £32,336, and the net profit of £49,027 was £28,309 more than in 1936. The passenger traffic *via* Harwich was 10·9 per cent. higher than in 1936 and almost equalled the record established in 1930. Week-end cruises by the ss. *Vienna* again formed a popular feature of the company's steamboat arrangements, and the special cruises by the *Vienna* and *Amsterdam* to Spithead for the Coronation Naval Review were fully booked. The Harwich—Zeebrugge train ferry continued to give satisfactory results and new traffics were successfully developed.

L.M.S.R. receipts increased by £40,482, due almost entirely to improved passenger traffic. On the other hand, working expenses decreased by £100,169, due to a fall of over £121,000 in the expenditure on repairs, with the result that it was possible to transfer £90,378 to renewal account (compared with a withdrawal of £38,625 in 1936) and still show a profit of £304,287, which was £11,648 greater than in the previous year. This was the best result recorded by the L.M.S.R. in any year.

The Southern Railway achieved a very striking result. Gross receipts, at £1,465,232, showed an increase of no less than £340,432, and passenger traffic alone yielded £936,253, an advance of £267,524 compared with 1936. Working expenses rose by £103,617, chiefly in respect of salaries and wages, fuel, and renewals, and an amount of £133,283 was transferred to renewal or suspense account, this being approximately the same as in 1936. The net result was a profit of £337,542, the highest since 1930 and an increase of £236,483 compared with the previous year. The great improvement in this company's steamboat business was largely due to the growth of the Continental traffic as a result of the fall of the French franc, and the incidence of the Coronation.

The Channel train-ferry from Dover to Dunkerque completed its first whole year in 1937, during which 74,000 passengers were conveyed, approximately one-half of these occupying the special sleeping cars. The ferry motorcar service, which did not begin until the completion of the inclined carriageway at Dover in June, proved satisfactory, 1,600 cars being conveyed. Freight traffic conveyed by the ferry service amounted to 60,000 tons, and it is expected that this will increase considerably as soon as the political situation in Southern Europe becomes more settled. At the annual general meeting of the company, Mr. Robert Holland-Martin emphasised the great importance to the Southern Railway of its steamboat traffic. He reminded the shareholders that this source of revenue is the most dependent on the international situation, and although the traffic last year exceeded all expectations it must be borne in mind that any change of conditions on the Continent may quickly reduce receipts.

Railway-owned Fleets

Particulars of the fleets of the respective companies are shown in the following table, together with particulars of the capital expenditure involved: —

Company	Steamboats			Capital expenditure on steamboats, marine workshops, and plant
	Owned by company	Indicated horse-power	Net registered tonnage	
				£
G.W.R.	11	20,200	3,999	414,965
L.N.E.R.	33	133,593	22,410	2,896,864
L.M.S.R.	39	139,165	22,211	2,828,372
S.R.	41	175,542	21,989	2,806,821

N.B.—The G.W.R. also works, but does not own, 3 vessels with a net registered tonnage of 3,024, and the L.N.E.R. and L.M.S.R. jointly own 4 vessels with a net registed tonnage of 494

Last year witnessed a number of interesting developments and improvements in the railway companies' steamboat equipment and services. The G.W.R. modernised the steamers *St. Helier* and *St. Julien*, engaged on the Weymouth—Channel Islands service, more covered accommodation being provided for passengers of both classes and the number of berths increased from 353 to 375. More room was also made available for the service of meals and refreshments. In order to cater for the increasing number of motorists travelling to Ireland *via* Fishguard and Rosslare, the decks of the *St. Andrew* and *St. David* were altered to enable cars to be loaded and discharged more expeditiously. These vessels are now staffed and prepared for the reception of passengers from 4.0 p.m. and the catering facilities have been extended to enable passengers to obtain dinner and breakfast on board.

The L.N.E.R. disposed of its steamer *City of Leeds*, built in 1903 for the Great Central Railway and employed for many years between Grimsby and the Continent. In April, 1937, a new steam tug was launched by Richard Dunston, Limited, Thorne, for service in Lowestoft Harbour. This tug, which was the first of its type to be built in this country, has twin screws fitted with the Kort nozzle, a device designed to increase the propulsive power of the vessel. In August a contract was placed for two further steam tugs for use in the fish docks at Grimsby, one to be fitted with the Kort nozzle, and the other with fire and salvage pump equipment.

Two new paddle steamers, the *Jupiter* and the *Juno*, were launched on behalf of the L.M.S.R. in the spring of last year from the yard of the Fairfield Shipbuilding & Engineering Co. Ltd. In November last, the company announced that the question of placing new vessels on the Holyhead—Dun Laoghaire mail route was receiving consideration and that plans were in hand for steamers to replace those at present working the service.

A new paddle steamer, the *Ryde*, built by William Denny & Bros. Ltd., for the Southern Railway, was launched at Dumbarton in April, 1937, and entered the Portsmouth—Isle of Wight service on July 1. This vessel, the seventh built for the service during the past 13 years, is licensed to carry 1,050 passengers, and has a speed of 14½ knots.

The Russian Railway Centenary

Some notes on the first public railway in Russia; the subsequent increases in mileage; and post-war developments

(*See also editorial note on page* 914)

The Soviet Union selected April 17 to mark the centenary of Russian railways, as it was on April 17, 1838, that steam traction was adopted for daily use on the Petersburg & Pavlovsk Railway. The Museum of Railway Transport in Leningrad arranged an exhibition entitled "100 Years of the Russian Railways," and this was opened in October last (as recorded in our issue of November 5). In addition, the Institute of Railway Transport has organised a series of lectures by specialists in railway transport history, and on the actual jubilee day this institute held an assembly at which a group of railway engineers graduated.

The size of Russia made the want of means of communication particularly felt in the early 19th century. England could supply iron cheaper than the Ural district, and Russian business circles were attracted by the early railway experiments in Great Britain. In 1834, the Austrian professor Franz Anton Ritter von Gerstner was called into consultation by Tschewkin, Chairman of the Russian Mining Engineers' Association, and, while in Russia, Gerstner saw the possibilities railways offered there. He presented a statement on the matter to the Tsar in January, 1835, with a plan for a large system and proposals for personal privileges; Petersburg to Moscow was his chief route. Representatives of canal interests, the police, and the treasury officials were against his ideas, and therefore the scheme was limited to a line from Petersburg to Pavlovsk ("from the chief city to an inn," as Kankrin, the Finance Minister, said), which had no commercial significance. Permission to make it was granted on January 3, 1836 (N.S.), and on April 3 a concession was made to a company, composed of Gerstner, Count Brobinsky, a merchant named Benedikt Kramer, and Herr Plitt, the Consul for Frankfort. On May 1 construction began on two sections.

The portion from Pavlovsk to Tsarskoe-Selo (now Pushkin) was opened on October 9, 1836. In an article by Dr. Saller recently published in Germany he says this does not agree with the usual German statement that the first section completed was from *Petersburg* to Tsarskoe-Selo. Nevertheless, our predecessor *The Railway Magazine* (Herapath's) clearly supports the view officially held in Soviet Russia, for in its issue of February, 1837, it states: "The traffic has hitherto been confined to the inhabitants of Pawlowsk and Zarkoe-Selo, the road from Petersburgh being impassable. Many families are about to remove from Petersburgh to these places as soon as the railroad is finished." At first horse traction was used, and that only on Sundays, but the ease with which loads were moved awakened keen interest. Locomotives arrived from England and Belgium in a few weeks and soon not only passengers but animals and timber were being carried, as well as complete road coaches. Gerstner is said to have been so anxious to avoid accidents that he went with every train for the first five days, but found it too much for him after 116 trips. Towards the end of 1837 the whole section, 27 km., was ready, and at 12.30 on November 12* the first train, driven by Gerstner, started and took 35 min. on the run. Views of locomotives were printed on all sorts of articles, and a piece was played at the Alexander theatre called "The trip to Tsarskoe-Selo." This statement also disagrees with German information, which says that Gerstner had already left Russia owing to disputes with the Government.

The railway was mainly a pleasure line, and in winter its traffic fell to nothing. The company obtained the right to make a pleasure garden at Pavlovsk with fountains and music facilities, and an organ played at the Petersburg station. For a time trains ran only on Sundays and holidays, and were hauled by locomotives, but from February 12, 1838, horse-drawn trains ran daily. The entire service was run by steam from April 17, 1838. Tickets were at first copper tokens, but counterfeits were soon in circulation.

There were many amusing circumstances connected with the early days of the line. As locomotive whistles were considered "terrifying," the railway company ordered "music" to be substituted, and specially powerful instruments were obtained from abroad, placed on the front of the locomotives, and a man stationed there to work them. To reduce injuries, the advice of the Russian proverb, "When I know where I am going to fall I put straw down first," was followed. A safety coach was placed between tender and passenger coaches in the form of one or two straw-covered flat trucks, upon which passengers were expected to be flung in the event of a collision. The line is stated to have cost 3½ million roubles. The gauge was 1·83 m. (6 ft.) and was thus wider than the present Russian gauge of 1·524 m. (5 ft.). The second public railway then in Russia was the Warsaw—Vienna line, built to the standard 1·435 m. (4 ft. 8½ in.) gauge; the third was the Petersburg (Leningrad)—Moscow line, and this was the first to have the present Russian gauge.

Real railway construction in present-day Russia began with the building of the Moscow—Petersburg line in 1843-51. According to a statement recently issued by the Soviet Union Year Book Press Service, by 1860 Russia possessed 1,589 km. of railway; in the next ten years another 9,654 km. were built; by 1880 a further 13,739 km.; by 1890 another 8,408 km.; and by 1900 a further 18,586 km. In 1914, the total length of the railway system within the boundaries of Tsarist Russia and Manchuria was 62,200 km., and several new lines were built during the war. In 1918, after the revolution, the Soviet State inherited from the old regime 58,849 km. of railways (not including the Chinese Eastern Railway). A large part of the line was in a ruined condition, with a big proportion of the rolling stock out of repair. The civil war still further aggravated the position. By 1926-27 it is stated that railway traffic in the U.S.S.R. had been brought up to the pre-war level. In 1913 the daily loading on the railways equalled 27,000 wagons; in 1921-22 it had fallen to 9,600 wagons; and by 1926-27 it had risen to 27,900 wagons. An all-round development of railway transport was then launched, and among the railways built was the Turkestan—Siberia trunk line, lines to the new industrial enterprises, the Magnitogorsk—Kartali Railway, the Karaganda Railway up the Lake Balkhash, and the Moscow—Donetz Basin line. Railway systems now extend over the territory of the Kuznetsk Basin and other regions of the Soviet Union. On January 1, 1938, the length of the railway system of the U.S.S.R. was 85,060 km. not counting lines opened to temporary traffic.

Simultaneously with the growth of the railway system, rolling stock and equipment have been developed. For freight services the 2-10-2 or "FD" class of locomotive has been adopted as the standard type for future use, and for main line passenger trains the 2-8-4 or "JS" class. As described in our Overseas columns in THE RAILWAY GAZETTE of March 18 (page 519), both incorporate the same standard boiler, cylinders, 12-wheeled tender, and as many other details as possible. They are two-cylinder locomotives of simple design and equipped with mechanical stokers, automatic couplers, and compressed air brakes. A further standard type with the same main features is a 4-6-4 for high speed passenger trains. Condensing tenders have been introduced to overcome water difficulties in arid parts of the country. Development is now apparent also in goods and passenger-carrying vehicles of which some notes were also given in the issue mentioned above.

* This date was October 30 (Russian calendar) or November 11 (new style) in 1837

B.T.-H. NEWCASTLE OFFICE. — In order to cope adequately with the increasing business in the Tyneside area, the British Thomson-Houston Co. Ltd. have transferred its Newcastle office to larger premises at Ellison Buildings, Ellison Place, Newcastle-on-Tyne.

XUM

QUESTIONS IN PARLIAMENT

Railway Company's Liability

Sir Frank Sanderson (Ealing—U.) on May 4 asked the Minister of Transport whether he was aware that, whilst the railway companies had agreed to compensate the holders of cheap tickets in the case of accidents, they were under no legal obligation to do so; and, would he take steps to make it compulsory upon the railway companies to compensate those who travelled by cheap tickets.

Dr. Burgin: I would refer my hon. friend to the statement which I made in reply to Questions on April 13. It will be seen from that statement that there is a common law liability on the railway companies and that they have given an undertaking not to seek to exempt themselves from this liability in relation to the holders of cheap tickets in certain circumstances. I am satisfied that the railway companies will implement that undertaking.

Mechanical Breakdowns on Underground Railways

Mr. J. F. E. Crowder (Middlesex, Finchley—U.), on May 4 asked the Minister of Transport whether his attention had been called to the large number of mechanical breakdowns which had occurred on the underground railways in the London area during recent months; how the number of such breakdowns during the past 12 months, for which figures were available, compared with the two similar preceding periods; and whether he was satisfied that adequate steps were being taken by the London Passenger Transport Board to maintain and modernise their equipment in such a way as to reduce the possibility of breakdowns to a minimum.

Dr. Burgin: With regard to the first part of the question I am in communication with the London Passenger Transport Board and will let my hon. friend know the result. As regards the last part, I have no reason to think that the London Passenger Transport Board does not take adequate steps to maintain and modernise its equipment in such a way as to reduce to a minimum the possibility of breakdowns.

Road & Rail Traffic Act

Mr. Tom Cassells (Dumbartonshire—Lab.) on May 4 asked the Minister of Transport if, in light of the decision by the appeal tribunal under the Road & Rail Traffic Act, 1933, to the effect that, if railway companies had transport facilities available for goods, other parties providing transport by road were not to be permitted to operate and were to be put out of business without compensation, he was prepared to take immediate steps to obviate such injustice in the future.

Dr. Burgin: I am not aware that the Appeal Tribunal has given any such general decision. The hon. member may have in mind a particular case, in regard to which I answered questions by the hon. member for Bradford South and other hon. members on March 16. Since that date the British Road Federation has discussed with my Department its proposals for the amendment of the Road & Rail Traffic Act.

Major General Sir Alfred Knox (Wycombe—U.) asked the Minister of Transport if his attention had been drawn to the decision of the appeal tribunal on February 18 by which at the instance of the L.N.E.R., licences had been withdrawn from the Blyth Transport Company and the B. & C. L. Transporters Limited, which had been conveying fish by road from Tyneside to Billingsgate since 1932; and, since this decision conferred a monopoly for the carriage of fish on the L.N.E.R., had caused loss to the transport companies, and involved four handlings of the fish instead of two, if he would take steps to prevent such occurrences in future.

Dr. Burgin: I would refer my hon. and gallant friend to the reply which I gave on this subject to the hon. member for South Bradford on March 16, and to the reply given today to the hon. member for Dumbartonshire.

Turkish Contract for Railway Material

Mr. David Adams (Consett—Lab.) on May 5 asked the Secretary to the Overseas Trade Department whether his attention had been drawn to the contracts for £4,200,000 worth of railway material placed by the Turkish government with a German firm; whether enquiries would be made as to possibilities of similar orders coming, in the future, to British firms; and whether British firms were able to offer railway material at prices comparing favourably with those of the German firm, or whether credit and other similar facilities were granted by the German firm to an extent which was not found practicable under British exports credits arrangements.

Mr. R. S. Hudson (Secretary to the Overseas Trade Department): The answer to the first two parts of the question is in the affirmative. The particular contract was dealt with by the Turkish Railways Administration which, I am informed, feels obliged to purchase in countries in which Turkey holds blocked balances.

Railways and A.R.P. Schemes

Mr. Robert Morrison (North Tottenham—Lab.) on May 9 asked the Secretary of State for the Home Department if he would ascertain whether employees of railway companies were being permitted by their employers to enrol as volunteers under local authorities air-raid precautions schemes.

Mr. Geoffrey Lloyd (Under Secretary of State for Home Dept.): I am informed that the companies are placing no obstacle in the way of employees desiring to enrol as volunteers under A.R.P. schemes of local authorities, but have warned them that their hours of duty under such schemes must necessarily be subject during an emergency to the railway service having first claim upon their services.

Mr. Morrison: Is the hon. gentleman aware that railway employees feel that the warning has been given in such a form, that they are receiving no encouragement to join in the local authorities' air-raid precautions schemes; and is he further aware that uncertainty as to the attitude of the employers as to these schemes is one of the biggest factors in preventing people from volunteering?

Mr. Lloyd: The hon. gentleman will, I am sure, appreciate the importance in the air-raid precautions schemes of the railways themselves as essential services, but I will look further into the point.

Sir Joseph Nall (Hulme—C.): Is it not a fact that the railway companies are going to considerable trouble and expense in training and organising men for this work?

Mr. Morrison: Will the Minister not ask the railway companies to make a public statement to the effect that they have no objection to their employees volunteering under local authorities' schemes, provided that the work required from them by the local authorities is done in their off-time?

Mr. Lloyd: In view of what the hon. member has said I will inquire further into the matter.

Railways and Road Hauliers

Mr. J. R. Remer (Macclesfield—C.) on May 9 asked the Minister of Transport if he was aware that every application for running commercial vehicles by road haulage contractors was being opposed by the L.M.S.R., and that in most cases the commissioner was refusing these licences; and, as the L.M.S.R. had been on many occasions unable to supply main-line trucks for the convenience of traders, and that, therefore, serious delay and inconvenience had been caused, would he introduce legislation with a view to preventing such hindrances to trade.

Captain Austin Hudson (Parliamentary Secretary to the Ministry of Transport): My information does not accord with the statements made in the question, but if my hon. friend has any particular case in mind I shall be glad to make inquiries.

Mr. Remer: Is the Parliamentary Secretary aware that in Manchester it is impossible on several days to get main-line trucks from the railway companies at the same time that they are opposing all applications for road vehicle licences?

Captain Hudson: The position is rather complicated, and I understand that the case is not as stated. Therefore, I want more information.

Mr. H. G. Williams (South Croydon—C.): Is it not the case that traders are

put to enormous expense through the fact that the railway companies oppose in a great many unnecessary cases, and cannot the Parliamentary Secretary use his influence with the railway companies not to pursue this dog-in-the-manger policy much longer?

There was no reply to this question.

Parliamentary Notes

Road Haulage Wages Bill

The Road Haulage Wages (No. 2) Bill was read a second time in the House of Commons on May 11, and has been committed to a committee of the whole House for Monday, May 16.

Wear Navigation & Sunderland Dock Bill

This Bill, originating in the House of Lords, authorises the River Wear Commissioners to execute works and alters the constitution of the Commissioners. On May 4 it was ordered to be reported, with amendments, for third reading by the House of Lords Unopposed Bills Committee.

Blackpool Improvement Bill

This Bill was reported, with amendments, by the House of Lords Unopposed Bills Committee on May 4. It is promoted by the Corporation of Blackpool and its main purpose is to provide for the carrying into effect of an agreement between that body and the L.M.S.R. company for the removal of the Blackpool Central station to another site.

L.P.T.B. Bill

This Bill came on May 3 before a Select Committee of the House of Commons. Among its purposes is to empower the London Passenger Transport Board to provide trolleybuses on certain routes, to construct new works and acquire lands, to extend the time for compulsory purchase of certain lands and the completion of certain works, and to enter into arrangements with the Central Electricity Board for supply of current in an emergency. A large number of petitions was deposited against the Bill principally with regard to the proposed trolleybus routes, but this class of petition was mostly withdrawn before the hearing. The chief matter remaining for discussion was that relating to electricity supply. On May 4 opposition was settled by a clause agreed with the electric supply companies, to the effect that an emergency supply should be given from the grid only if at the time no other authorised undertaker was able to give a convenient and adequate supply. The Bill as amended was ordered to be reported. It was considered in the House on May 10, and is to be read the third time.

REPAINTING SALTASH BRIDGE.—Work is at present in progress on repainting the Royal Albert Bridge, Saltash, which carries the G.W.R. over the River Tamar between Devon and Cornwall.

The Status of the Engineer

A meeting is to be held at the Caxton Hall, Westminster, on Monday, May 16, at 7 p.m. to consider the report of the committee on the status of the engineer, to which reference was made in our issue of April 29. Sir John Thornycroft will occupy the chair. There are a majority and a minority report, the former recommending the formation of an Engineers' Guild, the objects of which shall be "to promote the social and economic welfare of the Engineer, to stimulate public service in the profession, to encourage and develop the efficiency of the Engineer, and to promote unity in the profession."

The minority report, signed by one of the eight members of the committee, recommends that an association should be formed to be known as "The Association of the Engineering Profession" the object of which should be "to promote intercourse among members of all branches of the engineering profession, to give corporate form to their community of aim and interest and effective expression of their public spirit, and to promote the status and interests of the profession and of its members." Whereas the minority report recommends the limitation of membership during the initial period of the association to corporate members of the four senior institutions, the majority report would include the junior engineering institutions and graduates in engineering of a British university.

Royal Visit to Clydebridge

The King and Queen on May 4 visited the Clydebridge Steel Works, Cambuslang, Glasgow, of Colvilles Limited, and in a tour of inspection lasting one hour saw the whole plant in full operation. These works, now covering 140 acres, are engaged largely on the production of steel plates for shipbuilding, bridges, tube- and tank-making, and general engineering. During their visit the King and Queen saw steel in the plate mill destined for the sister ship of the *Queen Mary*, No. 552, now under construction. Other plates inspected were awaiting delivery to the North British Locomotive Co. Ltd., which is using Colvilles' steel in some new locomotives for the South African Railways. During the last four years the works have been producing to full capacity.

The Royal party was received at the works by Mr. John Craig, C.B.E., D.L. (Chairman of Colvilles Limited), who presented to the King and Queen Sir James Lithgow and Dr. A. McCance (Directors), and Mr. J. McCracken (Works Manager). By way of the melting shop, cogging mill, and electric power station, the party proceeded to the plate mill, where the King took over the controls and rolled a 3-ton steel plate. The visit concluded on the loading bank, where an impression was gained from the stacks of plates awaiting despatch of the extensive home and overseas market supplied by the Clydebridge works.

German Summer Services

Additional to three new high-speed diesel services, viz., Karlsruhe-Hamburg, Wilhelmshaven-Bremen-Berlin, and Berlin-Hamburg, the times of which are given in detail in this week's issue of our *Diesel Railway Traction Supplement*, the German State Railway is introducing with the inauguration of the summer timetables on May 15, two new fast "FD" non-stop trains, at 2.38 p.m. from Altona and 2.56 p.m. from Hamburg, reaching Berlin at 5.40 p.m. (65·1 m.p.h.), and a late evening outward service, leaving Berlin at 10.10 p.m., and reaching Hamburg at 12.50 a.m. (66·8 m.p.h.). With the existing high-speed steam services at 7.9 a.m. from Hamburg (73·7 m.p.h.) and 6.13 p.m. from Berlin (74·2 m.p.h.), there will thus be eight daily non-stop trains, four diesel-electric and four steam, making the journey of 178·1 miles at a combined average speed of 71·4 m.p.h.

There is some tendency to ease out the times of the "D" class express trains on various services, owing, doubtless, to the difficulty of keeping time with their heavy formations on the sharp point-to-point timings which have come into force in recent years. The considerable acceleration of the Rheingold Express, which is to leave Basle 3 hr. later than hitherto, but still to reach Hook of Holland in time to connect with the L.N.E.R. boat to Harwich, has been referred to in a previous issue.

Staff and Labour Matters

Railway Wages

A joint meeting of the executives of the National Union of Railwaymen, the Associated Society of Locomotive Engineers & Firemen, and the Railway Clerks' Association was held in London on Wednesday, May 4, with the object of arriving at a common programme of claims to be presented to the railway companies later in the year. An announcement made after the meeting stated that the executives of the three trade unions have been separately examining the position following the decisions of respective delegate conferences and in the light of the general railway situation. The existing agreement on wages and conditions continues until August, but it is expected the claims will be presented and negotiations opened with the companies before then. The new claims, when drafted, will probably go through the usual negotiating machinery and may ultimately reach the Railway Staff National Tribunal—the final court of appeal. The meeting was adjourned until May 16.

NOTES AND NEWS

New Station at Elstree South.—To meet the wishes of the Barnet Rural District Council, the London Passenger Transport Board has agreed to give the name Elstree South to the new station that will be built at the intersection of Elstree road and the Watford By-pass when the Northern Line is extended from Edgware to Bushey Heath.

Names for New L.M.S.R. Locomotives.—The ten L.M.S.R. 4-6-2 express passenger locomotives being built at Crewe works are to be numbered 6225-34 and named after the Duchesses of Gloucester, Norfolk, Devonshire, Rutland, Hamilton, Buccleugh, Atholl, Montrose, Sutherland, and Abercorn. Nos. 6225-9 inclusive will be streamlined, but will appear in L.M.S.R. standard red livery.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of March, 1938, amounted to $10,468,000, a decrease of $1,281,000 in comparison with March, 1937. In the working expenses of $10,101,000 there was an increase of $91,000, leaving net earnings $1,372,000 lower, at $367,000. Aggregate gross earnings for the first three months of 1938 were $30,166,000, a decrease of $1,501,000, and the net earnings of $1,248,000 showed a fall of $2,394,000.

Canadian National Earnings.—For the month of March, 1938, gross earnings of the Canadian National Railways were $14,611,629, a decrease of $2,020,352 in comparison with March, 1937. Operating expenses ($15,485,310) showed an increase of $615,709, with the result that there was a deficit of $873,681, against net earnings of $1,762,380. Aggregate gross earnings for the first three months of 1938 amounted to $41,222,982, a decrease of $3,754,207, and, as against net earnings of $2,317,496 for the first three months of 1937, there was a deficit on working of $3,731,654.

Signal Engineers' Visit to Electrical Works.—On May 6, a party of members of the Institution of Railway Signal Engineers, headed by Mr. G. H. Crook, President, and Mr. James Bcot, Vice-President, visited the New Southgate works of Standard Telephones & Cables Limited. The party was received by Mr. J. B. Griffiths, Chief of the Railway Signalling Department, with technical assistants and guides, and conducted round the principal workshops. A visit was also paid to the railway signalling demonstration room, where a new sequence switch route interlocking apparatus was inspected, with signal "P" sign equipment, telephone selector mechanisms, train describers, platform destination apparatus, and other details. In the evening supper was taken at the Falstaff Restaurant in the City. Mr. Crook, who was in the chair, spoke of the general work of the institution, and thanked Mr. Griffiths for the hospitality extended by the company that afternoon.

Institution of Mechanical Engineers Summer Meeting.—The summer meeting of the institution, to be held in Cardiff from May 30 to June 4, as announced in our issue of February 11, will open at 4 p.m. on May 30 with a reception by the Lord Mayor of Cardiff at the South Wales Institute of Engineers. The institution dinner will be held in the City Hall on June 1. A programme of visits to industrial premises in South Wales has been arranged, including an inspection of the G.W.R. docks at Cardiff, when the party will be entertained to lunch by the railway company.

Churchill Machine Tool Co. Ltd.—The year was a record year for this company, as mentioned by the Chairman (Mr. Arthur Chamberlain) at the recent annual general meeting. It was a record in sales, in profits, and in wages paid to employees. A substantial sum had had to be provided to cover the depreciation of investments as at December 31, and a further fall in values. The dividends which the directors had been able to recommend compensated the ordinary stockholders for the many years during which their shares were dividendless. The plant was in a high state of efficiency and the company started the new year with a full order book.

New Jugoslav Railway.—In connection with the £7,000,000 allotment from the great internal loan referred to in the news columns of our issue of April 22, the Jugoslav Government has now decided to proceed with the construction of the important 265-mile railway linking up Banja Luka-Doboj-Tuzla-Loznica, Valjevo, and Cacak. This line was described in our issue of April 23, 1937, with a map showing its alignment. The estimated cost of the railway will be met from the proceeds of the new loan, and it is expected that the construction, which will be entrusted to Jugoslav firms, will be completed within five years, in spite of the difficult country traversed.

French Travel Concessions.—To attract visitors from abroad, the French Government has just authorised the issue of a Tourist Travel Card (*carte de voyage touristique*), costing 4s. and valid two months, which will entitle the holder, subject to a minimum stay of 6 days in France, to 40 per cent. reduction on French railway fares. It will also entitle a motorist from abroad travelling in France with his own car, to a reduction of approximately 60 centimes a litre on the price of petrol for a maximum of 600 litres. This is arranged by means of a booklet of petrol coupons which will be obtainable not only in Paris, but probably also in several other important towns such as Rouen, Cherbourg, Le Havre, Dieppe, Calais, Boulogne, Nancy, Villefranche, Nice, Marseilles, Bordeaux, Nantes, St. Malo, and Dijon. Further details regarding these concessions are obtainable from the French Railways-National Tourist Office, 179, Piccadilly, W.1; the Southern Railway Continental Enquiry Office, Victoria station, S.W.1; or from any travel agent and the motoring associations. The new concessions come into force on May 15.

G.W.R. Final Ambulance Competition at Paddington.—On Friday, April 29, the final competition and presentation of awards for exceptionally meritorious first aid rendered by members of the G.W.R. staff during the preceding year took place at Paddington. Viscount Horne, the Chairman of the G.W.R., presided over the presentation ceremony which followed the competition, and distributed the various trophies and other awards. Among those supporting him were Sir Charles Wright, Director, Mr. S. G. Rowe, Assistant Secretary, and Mr. C. T. Cox, Divisional Superintendent. Prior to the distribution of the awards for first aid, Dr. H. Cavendish Fuller, the company's Chief Medical Officer, gave a résumé of the cases which had earned the awards and which had been selected from a large number of reports received.

Conveyance of Horses to Race Meetings.—As the result of arrangements made by the Racecourse Betting Control Board with the railway companies, the board will assist owners and trainers by bearing a portion of the cost of transport; and certain reductions in the charges made for the conveyance by rail of race-horses to race meetings were brought into effect, as an experiment, on May 1, as follows: The railway companies now convey by railway race-horses or ponies to race meetings (including point-to-point or pony race meetings) between stations in Great Britain for distances 150 miles and over, single journey mileage at the double-journey charge less 25 per cent., *i.e.*, single-journey charge plus 50 per cent., provided the animals on the return journey travel between the same points and over the line of the company or companies by whose route they were conveyed on the outward journey. The charges to be prepaid at the original forwarding station.

The Bihta Derailment Judicial Inquiry Report.—In an editorial on page 824 in our issue of April 29, we gave a summary, based on press reports from India, of Sir John Thom's judicial inquiry report upon the derailment of No. 18 down East Indian Railway express at Bihta between 3.50 and 4.0 a.m. on July 17 last. The full text of this report is published in *The Gazette of India* dated April 9. If copies of this issue of *The Gazette of India* are required, application should be made to the Publications Branch, Office of the High Commissioner for India, India House, Aldwych, London,

XUM

W.C.2. The Government resolution and report cover some 53 pages of printed foolscap. There is little to add to our summary of the report, though the point regarding the lurch to No. 6 down mail having nothing to do with the derailment is cleared up on examination of the full text. The finding considers that as the track, on inspection after the accident, was found to be in order, there could have been no slack, low joint or other irregularity just before the distortion began, that would have started the latter. The finding also agrees that the issue of a caution order, as a result of the mail driver's report, would have prevented the derailment.

Public Inquiry into the Working of the Northern Ireland Transport Act.—In the Overseas columns of our issues of April 15 and 22 we reported progress made regarding preliminaries to the two Northern Ireland Transport inquiries. The public inquiry was opened on May 2, by the Recorder of Belfast as Commissioner. Messrs. J. M. Whitaker, K.C., J. C. MacDermott, K.C., M.P., and L. E. Curran, instructed by Mr. Dunville-Coates, represented the Transport Board. Their general argument was that the railways were trying to use the Act to obtain a monopoly of transport, and that they claimed that the primary object of the Act was to swell the pool for their own benefit, whereas the Transport Board contended that its primary object was to serve the public and then to profit the board and finally the railways. Mr. Morrison, Manager of the Board, also gave evidence.

Indian State Railways Dinner.—Sir Guthrie Russell, K.C.I.E., Chief Commissioner of Railways, has consented to take the chair at the Indian State Railways Annual Dinner, to be held on Monday, May 30, at the East India United Service Club, 16, St. James's Square, S.W.1, at 7 p.m. for 7.30. Tickets may be obtained from Grindlay & Co., 54, Parliament Street, S.W.1; from the Manager, Indian Railways Bureau, 57, Haymarket, S.W.1; or from either the club Secretary, or M N. D. Calder at the E.I.U.S. Club.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 18th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
	£	£	£	£	£	£
L.M.S.R. (6,852½ mls.)						
Passenger-train traffic...	442,000	510,000	– 68,000	7,691,000	7,560,000	+ 131,000
Merchandise, &c. ...	472,000	528,000	– 56,000	8,629,000	8,869,000	– 240,000
Coal and coke ...	260,000	269,000	– 9,000	5,001,000	5,054,000	– 53,000
Goods-train traffic ...	732,000	797,000	– 65,000	13,630,000	13,923,000	– 293,000
Total receipts	1,174,000	1,307,000	– 133,000	21,321,000	21,483,000	– 162,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	274,000	321,000	– 47,000	5,022,000	4,999,000	+ 23,000
Merchandise, &c. ...	306,000	353,000	– 47,000	6,036,000	6,114,000	– 78,000
Coal and coke ...	231,000	251,000	– 20,000	4,699,000	4,670,000	+ 29,000
Goods-train traffic ...	537,000	604,000	– 67,000	10,735,000	10,784,000	– 49,000
Total receipts	811,000	925,000	– 114,000	15,757,000	15,783,000	– 26,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	185,000	211,000	– 26,000	3,221,000	3,164,000	+ 57,000
Merchandise, &c. ...	192,000	213,000	– 21,000	3,483,000	3,528,000	– 45,000
Coal and coke ...	101,000	108,000	– 7,000	2,109,000	2,089,000	+ 20,000
Goods-train traffic ...	293,000	321,000	– 28,000	5,592,000	5,617,000	– 25,000
Total receipts	478,000	532,000	– 54,000	8,813,000	8,781,000	+ 32,000
S.R. (2,147 mls.)						
Passenger-train traffic...	284,000	301,000	– 17,000	5,001,000	4,868,000	+ 133,000
Merchandise, &c. ...	52,500	58,000	– 5,500	1,079,000	1,094,000	– 15,000
Coal and coke ...	21,500	25,000	– 3,500	599,000	607,000	– 8,000
Goods-train traffic ...	74,000	83,000	– 9,000	1,678,000	1,701,000	– 23,000
Total receipts	358,000	384,000	– 26,000	6,679,000	6,569,000	+ 110,000
Liverpool Overhead ... (6½ mls.)*	1,488	1,219	+ 269	23,950	21,347	+ 2,603
Mersey (4½ mls.) ...	4,402	4,282	+ 120	79,649	76,445	+ 3,204
*London Passenger Transport Board ...	566,500	417,500	+ 149,000	25,307,000	25,067,000	+ 240,000
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,927	2,061	– 134	32,999	31,673	+ 1,326
,, ,, goods	444	484	– 40	7,993	9,005	– 1,012
,, ,, total	2,371	2,545	– 174	40,992	40,678	+ 314
Great Northern pass. (543 mls.)	9,200	9,450	– 250	156,250	151,250	+ 5,000
,, ,, goods	7,650	7,950	– 300	156,550	172,050	– 15,500
,, ,, total	16,850	17,400	– 550	312,800	323,300	– 10,500
Great Southern pass. (2,076 mls.)	34,656	35,636	– 980	538,559	520,855	+ 17,704
,, ,, goods	40,176	41,918	– 1,742	717,364	767,981	– 50,617
,, ,, total	74,832	77,554	– 2,722	1,255,923	1,288,836	– 32,913

* 45th week (before pooling). Bus Strike, 1937

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices May 11, 1938	Rise, Fall
G.W.R.				
Cons. Ord. ...	67⅝	55¾	52	–2½
5% Con. Prefce. ...	127	108	116½	– 1
5% Red.Pref.(1950)	113	109	109½	—
4% Deb.	113⅝	102½	109	– 1
4½% Deb.... ...	118	106	111½	—
4½% Deb.	124½	112	117½	—
5% Deb.	136½	122¾	129½	—
2½% Deb.... ...	76	64	67½	—
5% Rt. Charge ...	133 7/16	118	127½	—
5% Cons. Guar. ...	133¾	116½	127½	—
L.M.S.R.				
Ord.	36⅛	25⅝	18½	–2½
4% Prefce. (1923)	82½	65¾	52½	–5½
4% Prefce. ...	92½	77¾	71½	–4
5% Red.Pref.(1955)	107¾	102	102	—
4% Deb.	108	99¼	102	–½
5% Red.Deb.(1952)	117½	111	111½*	–2
4% Guar. ...	104	95⅞	99	–1½
L.N.E.R.				
5% Pref. Ord. ...	12½	6¾	4¾	–¾
Def. Ord.	6¼	3⅝	2¾	–¼
4% First Prefce.	79½	63	52½	–5
4% Second Prefce.	31½	21	19	–1½
5% Red.Pref.(1955)	101¼	89¾	89½	—
4% First Guar. ...	103	91⅞	96	–½
4% Second Guar.	97⅝	85½	86	–1
3% Deb.	84⅛	74	76	–½
4% Deb.	107¼	98½	101	–½
5% Red.Deb.(1947)	113½	106½	109½	—
4½% Sinking Fund Red. Deb.	110 3/16	105½	108	—
SOUTHERN				
Pref. Ord.... ...	98⅝	83½	75½	–1½
Def. Ord.	27⅞	16¾	19¾	–½
5% Pref.	126 1/16	105 15/16	113½	–1
5% Red.Pref.(1964)	118	110¼	113½	—
5% Guar. Prefce.	133¾	116¾	126½	—
5% Red.Guar.Pref. (1957)	118½	111½	115	—
4% Deb.	112	101¼	107½	–1
5% Deb.	135¾	123½	127½	—
4% Red. Deb. 1962–67	113	105	108½	—
BELFAST & C.D.				
Ord.	5	4	4½	—
FORTH BRIDGE				
4% Deb.	106	99½	100½	—
4% Guar. ...	105¾	99	101½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	5½	—
G. SOUTHERN (IRELAND)				
Ord.	50	21½	20	—
Prefce.	61	34	28½	—
Guar.	94¾	69½	59	+6½
Deb.	95	82⅛	80¼	+⅜
L.P.T.B.				
4½% "A" ...	123¾	110½	118½	—
5% "A" ...	135	121½	127½	—
4½% "T.F.A." ...	108¾	104	106½	+½
5% "B" ...	125	114½	119½	–1
"C"	99¾	75	77	–1
MERSEY				
Ord.	42⅜	22	19	—
4% Perp. Deb. ...	103	96¾	100	—
3% Perp. Deb. ...	77⅝	74½	74½	—
3% Perp. Prefce.	68¾	61¼	64	+1

* ex-dividend

CONTRACTS AND TENDERS

Locomotives for India

The Skoda Works Limited, through Carters (Merchants) Limited, has received an order from the South Indian Railway for 16 2-6-4 ST-class superheated metre-gauge tank locomotives, to be supplied to the inspection of Messrs. Robert White & Partners.

G. H. Sheffield & Co. (Engineers) Ltd., has received an order from the Crown Agents for the Colonies for 30 Sheffield-Twinberrow carriage bogies, 5 ft. 6in.-gauge, fitted with Framwel axleboxes, required for the Ceylon Government Railways.

S.A. Anglo-Franco-Belge de Material de Chemins-de-Fer has received an order through James Clements & Company from the South Indian Railway for one YD-class locomotive boiler, to be supplied to the inspection of Messrs. Robert White & Partners.

Stewarts and Lloyds Limited has received an order from the Central Argentine Railway for 5,500 steel boiler tubes.

Beckett, Laycock & Watkinson Limited has supplied Beclawat Typhoon Major half-drop windows and sliding door gear for the Walker railcars for the Trujillo Railway for which railcars the bodies are being built by the Northern Counties Motor & Engineering Co. Ltd.; and Typhoon Major windows for the Wickham railcars under construction for the Central of Peru Railway.

The Egyptian State Railways Administration has recently placed the following orders:

S.A. des Usines Gilson (Items Nos. 1-4, total cost £149 19s. 6d., delivery f.o.b. Antwerp) and P. & W. MacLellan Limited (Items Nos. 5-8, total cost £158 13s. 9d., delivery f.o.b. Glasgow): mild steel rounds and plates (Ref. No. E.S.R. 1.405).

Clouteries et Trefileries des Flandres: Galvanised iron wire (Ref. No. E.S.R. 5.168, total price £298 15s., delivery free Gabbary Quay, Alexandria).

S.A. Cie. Metallurgique de la Campine: Antimony (Order No. 6.274, total price £255 18s. 1d., delivery c.i.f. Alexandria).

Plywood & Timber Co. Ltd.: Birch plywood (Order No. 48.88, total price £375, delivery f.o.b. London).

British Steel Piling Co. Ltd.: Plant and tools for bridges (Ref. No. E.S.R. 13.687, total cost £2,128, delivery f.o.b. London).

Frederick Smith & Company: Copper wire (Ref. No. E.S.R. 30.414, total price £755 12s. 6d., f.o.b. Liverpool).

H. J. Skelton & Co. Ltd.: Mild steel plates (Ref. No. E.S.R. 1.425, total value £804, delivered Gabbary Quay, Alexandria); and mild steel bars (Ref. No. E.S.R. 1.409, total price £311 12s. 6d., delivery free Gabbary).

Metal Traders Limited: Tin ingots (Ref. No. E.S.R. 306G3/8, delivered f.o.b. London).

George Turton, Platts & Co. Ltd.: Helical springs (Ref. No. E.S.R. 21.769, total price £360, delivery f.o.b. Liverpool).

Etabs. Duchesne & Cie: Weighing machines (Ref. No. E.S.R. 55.291, delivery f.o.b. Marseilles or Antwerp).

Thomas de la Rue & Co. Ltd.: 20,000 insulators (total price £380, delivery f.o.b. London).

Hermsdorf-Schomberg-Isolatoren: 80,000 insulators (total price £960, delivery f.o.b. Hamburg).

Hugh Gordon & Co. Ltd.: round copper bars (adjudication of February 16, total price £1,671 17s., delivery f.o.b. Hamburg).

D. Wickham & Co. Ltd. has received an order from the Antofagasta (Chili) & Bolivia Railway for five No. 5a petrol-driven inspection trolleys.

The Chloride Electrical Storage Co. (India) Ltd. has received an order from the Indian Stores Department for 19 sets of lead-acid train-lighting cells.

Heatly & Gresham Limited has received orders from the Chief Controller of Stores, Indian Stores Department, for a total of approximately 4,000 steel smoke and flue tubes and 10 lead-acid and four alkaline sets of train-lighting cells.

Henschel & Sohn A.G. has received an order from the Morvi Railway to the inspection of Messrs. Robert White & Partners for two metre-gauge locomotive boilers.

T. Robinson & Sons Ltd. has received an order from the Central Uruguay Railway for one self-contained motor-driven band sawing machine.

The Great Western Railway announces the following works to be undertaken:

Weymouth.—The accommodation at Weymouth station is to be modernised and extended, involving additional siding accommodation for dealing with excursion trains, &c., and to facilitate quay traffic, the alteration and extension of platforms, and the construction of new station buildings. Work on the siding accommodation is being begun at once.

Chippenham, Banbury, and Tondu.—To afford protection to staff working on the coal stage at Chippenham, a verandah roof is being erected there, together with sliding shutters which can be travelled to the ends of the stage when coaling from the stack at the back of the stage. At Banbury and Tondu, weather screens will be provided at the coal stages to give protection to men working there.

Swindon Works.—There is a continual increase in electric welding operations in the locomotive works and two new welding plants are to be installed in the "V" (boiler) shop and the "BE" (engine erecting) shop, respectively, where new plant will be of most service; at the same time the existing sets in the various shops will be rearranged.

Bordesley viaduct, Birmingham.—This viaduct, which carries the main lines between Bordesley station and Birmingham tunnel, a distance of over ½ mile, was constructed in 1852 of brick main arches with subsidiary arches over them, and was widened in 1910. The condition of the subsidiary arches of the original structure is such that their complete replacement by concrete slabs is to be undertaken during the next two years.

Bridge near Kidlington station.—This bridge is to be reconstructed, strengthened, and widened to 60 ft. by arrangement with the Oxford County Council.

Walsall Street bridge, Wolverhampton.—Walsall Street bridge, Wolverhampton, carrying the road over the railway, is to be reconstructed and strengthened by arrangement with the Wolverhampton Corporation.

Damers Road bridge, Dorchester.—At the request of the Dorset County Council the company will reconstruct and lengthen this structure.

The Gondal Railway Administration has placed orders to the inspection of Messrs. Robert White & Partners with the North British Locomotive Co. Ltd., Vulcan Foundry Limited, Hunslet Engine Co. Ltd., and W. G. Bagnall Limited for locomotive spares.

The Superheater Co. Ltd. has received orders from the South Indian Railway for 200 superheater elements and 438 ball-ended tubes, to be supplied to the inspection to Messrs. Robert White & Partners.

Argentine Inquiry for 64 Diesel Locomotives

The Argentine State Railways Administration is calling for tenders for 64 diesel locomotives, the purchase of which is included in a general plan for the improvement of the goods train services. The cost of construction is estimated at approximately $5,000,000 (£300,000).

Tenders are invited by the Egyptian State Railways Administration receivable at the office of the Superintendent of Stores, Saptieh, Cairo, by May 30, for the supply of carriage brake-valves, pipes, elbows, sockets, and nuts.

Tenders are invited by the Egyptian State Railways Administration, receivable at the Stores Department, Saptieh, Cairo, by May 21, for the supply of 21,000 kg. internal-combustion engine oil.

Tenders are invited by the Bengal & North Western Railway, receivable by May 31, at 237, Gresham House, Old Broad Street, London, E.C.2, for the supply of six boilers required for F class superheated locomotives.

Tenders are invited, on a rupee basis, receivable by the Agent, North Western Railway, Lahore, India, by May 30, for the supply of 30 superheated locomotive boilers for SP/S class 4-4-0 engines and two for SG/C class 0-6-0 conversion engines. Drawings are on view at the office of Hodges, Bennett & Co. Ltd., 16, Victoria Street, Westminster, London, S.W.1.

Tenders are invited, on a rupee basis, receivable by the Agent, North Western Railway, Lahore, India, by June 1, for the supply of 875 sets of combination fishplates.

Tenders are invited by the Egyptian State Railways Administration receivable at the Stores Department, Saptieh, Cairo, by June 6, for the supply of 996 metres of non-armoured cable.

Tenders are invited by the Egyptian State Railways Administration, receivable at the office of the Superintendent of Stores, Saptieh, Cairo, by June 16, for the supply of 250 carriage and wagon tyres.

The Director of the Port of Porto Alegre is calling for tenders, to be presented in Brazil by June 13, for the supply of a floating crane with a capacity of 50 tons. Firms desirous of offering a crane of United Kingdom manufacture can obtain further details from the Department of Overseas Trade, London, S.W.1.

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LEGAL AND OFFICIAL NOTICES

In the Court of the Railway Rates Tribunal.

Road and Rail Traffic Act, 1933.

Agreed Charges.

NOTICE IS HEREBY GIVEN that Applications for the approval of Agreed Charges under the provisions of Section 37 of the Road and Rail Traffic Act, 1933, short particulars of which are set out in the Schedule hereto, have been lodged with the Railway Rates Tribunal.

The Procedure to be followed in regard to the inspection of the said Applications and the filing of Notices of Objections is that published in the *London Gazette* of 28th July, 1936.

Printed copies of the Procedure can be obtained from the Railway Rates Tribunal, Bush House, Aldwych, London, W.C.2.

Notices of Objection to any of the said Applications must be filed on or before the 31st May, 1938.

A copy of each Application can be obtained from Mr. G. Cole Deacon, Secretary, Rates and Charges Committee, Fielden House, Great College Street, Westminster, London, S.W.1, price 1s. post free.

T. J. D. ATKINSON,
Registrar.

5th May, 1938.

Number of Application	Name of Trader and General Description of Traffic
1938—No. 275	V. BENOIST LIMITED, 17, Ramillies Place, London, W.1; Groceries, Preserves and Provisions, etc.
1938—No. 276	DAVIES BOTTLED FRUITS LIMITED, Bank Buildings, 16, St. James's Street, London, S.W.1; Bottled and Canned Fruits, etc.
1938—No. 277	DUNN'S FOOTWEAR LIMITED, Willoughby Lane, Tottenham, N.17; Returned Empties.
1938—No. 278	W. & T. AVERY LIMITED, Soho Foundry, Birmingham; Machines and Machinery, etc. (*Applicable also to traffic consigned by one Associated or Subsidiary Company.*)
1938—No. 279	WM. GAYMER & SON LTD., Attleborough, Norfolk; Cider, etc.
1938—No. 280	HORLICKS LIMITED, Slough; Malted Milk, Lemon Squash, etc.
1938—No. 281	MONSOON COCOA MATTING CO. LTD., Clydesdale House, 27, Turner Street, Manchester, 4; Mats and Matting.
1938—No. 282	WITHIN'S PAPER STAINING COMPANY, Bury Road, Radcliffe; Paper Hangings.
1938—No. 283	A. P. BURT & SONS LTD., Severn Paper Mills, Portishead; Paper Bags and Paper.
1938—No. 285	SOMERVELL BROS. LTD., Kendal; Boots, Shoes, etc.
1938—No. 286	JOSEPH BOSTOCK LIMITED, 2, Barton Street, Beeston, Notts; Preserves, etc.
1938—No. 287	DARLASTON GALVANISED HOLLOWARE CO. LTD., Booth Street, Darlaston; Hollow-ware, etc.
1938—No. 288	DOBSONS & M. BROWNE & CO. LTD., "Delbeta House," Queen's Road, Nottingham; Curtains, etc. (*Applicable also to traffic consigned by one Associated or Subsidiary Company.*)
1938—No. 289	JOHN HARTLEY & SONS LTD., Gillroyd Mills, Morley; Woollen Cloth.
1938—No. 290	F. KEAY & CO. LTD., 57, Church Street, Birmingham; Paper, Stationery, etc.
1938—No. 291	MANBRE & GARTON LIMITED, Winslow Road, Hammersmith, London, W.6; Returned Empties.
1938—No. 292	CHESEBROUGH MANUFACTURING COMPANY (CONSOLIDATED), Victoria Road, Willesden, London, N.W.10; Druggists' Sundries, etc.
1938—No. 293	W. H. EYLES & CO. LTD., Crow Lane, Bristol, 1; Groceries, Preserves and Provisions, etc.
1938—No. 294	FARLEY'S INFANT FOOD LIMITED, Torr Lane, Plymouth; Biscuits, etc.
1938—No. 295	T. B. FINNEY & CO. LTD., Cornbrook Spice Mills, Manchester, 15; Mixed Groceries, Gelatine, Sausage Meal, etc.
1938—No. 296	WALTER HENDERSON LIMITED, Saffronhall Factory, Hamilton; Textiles, Cotton and Linen Goods, etc.
1938—No. 297	JAMESON'S CHOCOLATES LIMITED, Willoughby Lane, Tottenham, London, N.17; Confectionery, etc. (*Applicable also to traffic consigned by one Associated or Subsidiary Company.*)
1938—No. 298	JAMES C. LAKE & CO., Little Sutton Street, Clerkenwell, London, E.C.1; Paper, etc.
1938—No. 299	LESME LIMITED, Sunya House, Scrubs Lane, London, N.W.10; Chocolate, Cocoa, Confectionery, etc.
1938—No. 300	PASHON PRODUCTS LIMITED, Trading Estate, Slough; Cordials and Preserves.
1938—No. 301	SCRUM LIMITED, 3, Thornhill Road, London, N.1; Scouring Powder.
1938—No. 302	ULTRA ELECTRIC LIMITED, Western Avenue, Acton, London, W.C; Wireless Apparatus, etc.
1938—No. 303	WASDELL LIMITED, Holdford Road Works, Witton Birmingham, 6; Hardware, Glass, Mudguards, etc.
1938—No. 304	THOMAS WYATT & SON LTD., Burlington Works, Keymer Street, Manchester, 11; Stationery, School Requisites. (*Applicable also to traffic consigned by one Associated or Subsidiary Company.*)
1938—No. 305	C. W. HORRELL LIMITED, Rushden, Northants; Boots and Shoes.
1938—No. 306	KAYSER-BONDOR LIMITED, 101–103, Wood Street, London, E.C.2; Hosiery, etc.
1938—No. 307	C. & H. COVERDALE, 40, Friar Lane, Leicester; Hosiery, Underwear and Knitwear.
1938—No. 308	J. PULLAR & SONS LTD., Perth; Dyed and Cleaned Goods. (*Applicable also to traffic consigned by one Associated or Subsidiary Company.*)
1938—No. 309	LENNARDS LIMITED, Queen's Road, Bristol, 8; Boots and Shoes, Hosiery, etc.
1938—No. 310	J. LYONS & CO. LTD., Cadby Hall, Kensington, London, W.14; Chocolates, Mixed Pastries, etc.
1938—No. 311	POLIKOFF LIMITED, 31–51, Chatham Place, London, E.9; Clothing. (*Applicable also to traffic consigned by one Associated or Subsidiary Company.*)
1938—No. 312	RICHMOND SAUSAGE CO. LTD., 7–11, Linacre Road, Litherland, Liverpool, 21; Sausages.
1938—No. 313	MINSTERLEY CREAMERIES LIMITED, Nova Scotia Street, Birmingham; Butter, Cheese, etc.
1938—No. 314	STRINGER BROTHERS, Corngreaves, Cradley Heath, Staffs; Spades, Shovels, Forks, etc.
1938—No. 315	VITACREAM LIMITED, 48, Mark Lane, London, E.C.3; Butter Flavour, Vitacream, etc.
1938—No. 316	THE VALOR CO. LTD., Bromford, Erdington, Birmingham; Oil Stoves, Fire Fighting Appliances, Hardware, etc. (*Applicable also to traffic consigned by one Associated or Subsidiary Company.*)
1938—No. 317	BUNCHER & HASELER LIMITED, Branston Street, Birmingham, 18; Aluminium Ware, Hardware, Hollow-ware, etc.
1938—No. 318	H. BANCKS LIMITED, Travel Works, Westbury Road, High Street, Walthamstow, London, E.17; Fibreboard Cases.
1938—No. 319	GOSPO LIMITED, 14, Finsbury Circus, London, E.C.2; Cleansing Pastes, Soap, etc.
1938—No. 320	J. G. GRAVES LIMITED, Sheffield; Furniture, General Stores Wares, etc.
1938—No. 321	THE GREAT UNIVERSAL STORES LIMITED, Devonshire Street, Ardwick, Manchester; Furniture, General Stores Wares, etc., ex Wembley. (*Applicable also to traffic consigned by five Associated or Subsidiary Companies.*)
1938—No. 322	THE GREAT UNIVERSAL STORES LIMITED, Devonshire Street, Ardwick, Manchester; Furniture, General Stores Wares, etc., ex Manchester. (*Applicable also to traffic consigned by eight Associated or Subsidiary Companies.*)
1938—No. 323	ROSE, MORRIS & CO. LTD., 57, City Road, London, E.C.1; Musical Instruments, Toys, Hardware, etc.
1938—No. 324	WHEATLEY & BATES LIMITED, 14, Napier Street, Sheffield, 11; Hop Bitters, Ginger Beer, etc.
1938—No. 325	F. & H. SUTCLIFFE LIMITED, Wood Top, Helden Bridge, Yorks; Huts, Hardware, Paints and Colours, etc.
1938—No. 326	W. H. SMITH & SON LTD., Strand House, London, W.C.2; Books, Stationery, Newspapers, etc., ex King's Cross and Marylebone.
1938—No. 327	W. H. SMITH & SON LTD., Strand House, London, W.C.2; Books, Stationery, Newspapers, etc., ex Broad Street, Camden Town and Somers Town.
1938—No. 328	DAN BUTLER, Cemmaes, Machynlleth, Montgomery; Moss.
1938—No. 329	JOHN HAWLEY & CO. (WALSALL) LTD., Goodall Works, Bloxwich Road, Walsall, Staffs; Marquees, Tents, Camping Equipment, Garden Furniture, Hardware, etc.
1938—No. 330	S. & J. WATTS & CO., Manchester; Textiles, etc.
1938—No. 331	J. LYONS & CO. LTD., Cadby Hall, Kensington, London, W.14; Ice Cream.

Crown Agents for the Colonies

COLONIAL GOVERNMENT APPOINTMENTS

APPLICATIONS from qualified candidates are invited for the following post:—

ASSISTANT
LOCOMOTIVE SUPERINTENDENT

required for the Kenya and Uganda Railways for one tour of 24-48 months, with possible permanency. Free quarters and passages and liberal leave on full salary. Salary £480-£20-£600-£30-£720 a year, but the commencing salary may be increased if the qualifications of the applicant justify it. Candidates, aged 26-36, must have a sound theoretical knowledge of engineering and had practical training in Locomotive working with a British Railway, and have subsequently filled a position of responsibility in a Running Department.

Apply at once by letter, stating age, whether married or single and full particulars of qualifications and experience and mentioning this paper to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/5875.

South Indian Railway Company, Limited

THE Directors are prepared to receive Tenders for the supply of:—

SOLID DRAWN STEEL BOILER TUBES

Specifications and Forms of Tender will be available at the Company's Offices, 91, Petty France, Westminster, S.W.1.

Tenders addressed to the Chairman and Directors of the South Indian Railway, Limited, marked "Tender for Boiler Tubes," with the name of the firm tendering, must be left with the undersigned not later than 12 noon on Friday, the 3rd June, 1938.

The Directors do not bind themselves to accept the lowest or any tender.

A charge, which will not be returned, will be made of 5s. for each copy of the Specification.

Copies of the Drawings may be obtained at the Offices of the Company's Consulting Engineers, Messrs. Robert White & Partners, 3, Victoria Street, Westminster, S.W.1.

E. A. S. BELL,
Managing Director.

91, Petty France,
Westminster, S.W.1.
11th May, 1938.

THE MADRAS & SOUTHERN MAHRATTA RAILWAY COMPANY LIMITED invite Tenders for:—

172 STEEL TYRES FOR LOCOMOTIVES
BROAD GAUGE.

Specification and Form of Tender can be obtained from the Company's Offices, 125, Victoria Street, Westminster, London, S.W.1.

Fee ONE GUINEA, *which will not be returned.*

Tenders must be submitted not later than 2 o'clock p.m. on TUESDAY, 31ST MAY, 1938.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
V. CRASTER,
Secretary.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to:—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

XUM

Legal and Official Notices—*continued*

Great Southern Railways Company

CONTRACTS, 1938

THE Directors of the Great Southern Railways Company are prepared to receive Tenders for the supply of the undermentioned Stores for Six and Twelve Months commencing 1st July, 1938 :—

	No. of Form.		No. of Form.
Axles, Steel Crank for Locos ..	101	Oils, Switch and Fuel	165
Axles, Steel Straight for Locos and Tenders ..	102	Paints, Mixed ready for use	142A
Axles, Steel Straight for Cars and Wagons ..	103	Paints, Spraying ..	155A
Acid, Sulphuric ..	3D	Rubber Rings, for Vac. Brake ..	128
Brass and Copper Sheet, Tube and Wire	115	Rubber Sleeves, for Vac. Brake ..	126
Bolts and Nuts and Washers ..	15	Springs, Volute ..	107
Calcium Carbide ..	136	Steel, Bloom ..	109
Castings, Iron Signal	152	Steel, Spring ..	106
Drills, High Speed Twist	147	Steel Plates, Sheets and Bars ..	123
Foundry Requisites	42	Steel, Reeled Bars	123A
Grease for Wagon Axleboxes ..	158	Steel Plates for Loco Boilers ..	116
Handles, Tool ..	141	Signal Work Sundries	151C
Iron, Bar	151B	Tyres for Locos ..	104
Iron, Cable Bar ..	151A	Tubes and Fittings, Steel and Wrought Iron	29
Nuts, Black and Bright	15A	Tin Plates ..	22
Oil, Mineral Roof Lamp	154	Timber, Red Deals, DUBLIN ..	36
Oil, Colza or Rape	156	Timber Deals and Flooring, WATERFORD DISTRICT..	38B
Oil, Paraffin, Gas and Cleaning ..	157		

Forms of Tenders can be obtained on PAYMENT of 6d. each from the STORES SUPERINTENDENT, GENERAL STORES DEPARTMENT, G. S. RAILWAYS, INCHICORE, DUBLIN. Applications for forms by post must be accompanied by Postal Order. STAMPS CANNOT BE ACCEPTED. All enquiries for information should be directed to the Stores Superintendent.

Patterns can be inspected at the GENERAL STORES DEPARTMENT, INCHICORE, on and after MONDAY, 16th MAY, 1938, between the hours of 10.0 a.m. and 4.0 p.m. (except Saturdays).

Tenders may be enclosed in the envelope supplied for the purpose with each Schedule and must be posted so as to be with the undersigned before 5.0 p.m. on WEDNESDAY, 1st June, 1938.

The Directors will not consider any Tender unless it is furnished on the Company's Form, and do not bind themselves to accept the lowest or any Tender.

The decision of the Directors will be communicated not later than FRIDAY, 8th July, 1938, to those Firms ONLY whose Tenders are accepted.

By Order.
H. S. COE,
Secretary.

Kingsbridge Station,
Dublin,
May, 1938.

Universal Directory of Railway Officials and Railway Year Book

43rd Annual Edition, 1937-38

Price 20/- net.

THE DIRECTORY PUBLISHING CO. LTD.
33, Tothill Street, Westminster, S.W.1.

His Exalted Highness the Nizam's State Railway

APPLICATIONS are invited for the post of Carriage Foreman in the Locomotive, Carriage and Wagon works of this railway in the State of Hyderabad, India.

Qualifications.

1. Age should be between 35 and 40 years.
2. Applicants must have served an apprenticeship and received subsequent training on the carriage and wagon side of an English railway. Considerable experience on carriage body and underframe repairs and some experience of new coach body building is essential.
3. Applicants should possess a thorough knowledge of scheduling systems for progressing carriage and wagon repairs and for new coach body building. Preference will be given to candidates with experience in the drawing office and on wagon repair work.

Salary will be payable in the currency of the Hyderabad State* in the grade of O.S. Rs. 475—25—700 at a commencing salary according to qualifications and experience. The salary (minimum and maximum), after adding Provident Fund benefit, corresponds approximately to £396 and £585 per annum respectively.

Applications, giving full details of age, qualifications, training and experience, whether married or single, and accompanied by copies of testimonials, should be addressed to the undersigned not later than 19th May, 1938.

F. ADAMS,
Secretary.

H.E.H. the Nizam's State Railway Board,
274, Gresham House,
Old Broad Street,
London, E.C.2.
9th May, 1938.

* The Hyderabad State currency usually varies from Oosmania Sicca (O.S.) rupees 114 to 117 per hundred British India rupees, but no rate of exchange is guaranteed.

Railway and Other Reports

Midland Railway Co. of Western Australia Ltd.—Announcement is made of an interim payment of interest on the second mortgage cumulative income debenture stock on account of the year ending June 30, 1938, of 2 per cent., payable on July 1.

South Wales Transport Co. Ltd.—This company, a subsidiary of British Electric Traction Co. Ltd., is paying 18 per cent. on the 6 per cent. cumulative preference shares on account of arrears for the three years ended December 31, 1937. In April, 1937, 18 per cent. was paid on account of arrears.

South Indian Railway Co. Ltd.—The directors have decided to pay on July 1, an interim dividend from surplus profits of ½ per cent., less income tax (compared with ½ per cent. paid on July 1, 1937) making with the interest guaranteed for the half-year ending June 30, 1938, namely, 1¾ per cent., less income tax, a total distribution for the half-year of 2¼ per cent.

British Electric Traction Co. Ltd.—Revenue for the year ended March 31, 1938, amounted to £669,404, against £585,673 for 1936-37. Net profit (subject to audit) is returned at £446,472, being an increase of £55,576 compared with the previous year. After allowing for the full preference and the preferred ordinary stock dividends it is proposed to pay the usual dividend of 5 per cent. on the deferred ordinary stock, together with the usual bonus of 10 per cent., free of tax, in fully paid £1 deferred ordinary shares. A sum of £185,323 (against £138,659) is added to undivided profits account.

Channel Tunnel Company.—The company reports for 1937 a credit balance of £427. This, added to the £12,233 brought in, makes a total of £12,660 to be carried forward. Unsettled political conditions since the issue of the previous report have militated against any revival of interest in the project of a Channel tunnel.

Nitrate Railways Co. Ltd.—The audit of this company's accounts is not yet completed, but sufficient is known to enable the directors to make a close estimate of the financial outcome of working for the year 1931. As a result and in view of remittances received from Chile they will recommend at the annual meeting to be held shortly a dividend of 2s. a share on the preferred converted ordinary and the ordinary unconverted shares for 1937.

Institute of Transport Congress

The annual congress of the Institute of Transport is being held next week from Wednesday, May 18, to Saturday, May 21. Three papers are to be submitted for discussion, the first at 3 p.m. on May 18 entitled "The Regulation and Control of Transport in Europe" by Archibald Henderson, Chairman of the Traffic Commissioners, Southern Area, Scotland. The second and third papers will be presented at 10 a.m. on May 19 and 20 respectively and are entitled "The Price of Transport" and "The Conception of Public Utility in Relation to Transport." The former is by Mr. George Mills, Divisional General Manager, Scottish Area, L.N.E.R., the latter by Mr. Alexander Gray, Professor of Political Economy, University of Edinburgh.

Visits have been arranged to the control system and power signalling installation at Waverley station, L.N.E.R., the central bus garage and Shrubhill tramway works of the Edinburgh Transport Department, the New Street garage works of the Scottish Motor Traction Co. Ltd., Granton Harbour, and Leith Docks. In addition visits will be paid to Gleneagles and the British Empire Exhibition at Glasgow, and a trip has been arranged through the border country.

On Wednesday evening the Lord Provost, magistrates, and council of the City of Edinburgh are holding a reception at the Assembly Rooms, and the President of the Institute is to hold a reception at the North British Station Hotel on Friday evening. The dinner of the Scottish Section will take place on Thursday evening at the North British Station Hotel.

Forthcoming Meetings

May 18 (*Wed.*).—**Rhodesia Railways Limited** (Ordinary General), 2, London Wall Buildings, E.C.2, at 2.30 p.m.

May 26 (*Thurs.*).—**Companhia do Caminho de Ferro de Benguela** (Annual General), Lisbon, Largo do Quintela, 3, at 11 a.m.

XUM

Railway Share Market

Home railway stocks have reacted sharply this week under the influence of the disappointing character of the past week's traffics. It had been anticipated that the latter would compare unfavourably with those of the corresponding period of a year ago when receipts reflected the influx of visitors for the Coronation and also larger takings arising from the bus strike. The total decrease of **£327,000**, however, was larger than market estimates, and it is apparent that the main line railways are continuing to be affected by the less active general trade conditions. So far as can be judged, there is little scope for recovery in the junior stocks until traffics are more encouraging, although it should not be overlooked that the dull conditions ruling on the Stock Exchange partly explain the lower prices made this week. When the stock and share markets show sustained activity Home railway securities will be expected to make some response. The current level of prices would appear to suggest doubts whether dividends will be maintained, but much may, of course, depend on the extent to which costs increase, and, moreover, it is possible that traffic receipts may develop an upward movement in the second half of the year.

Southern deferred has declined to **19⅜**, but was less reactionary than L.M.S.R. ordinary or L.N.E.R. second preference, both of which are now lower than Southern deferred. The market is continuing to take the view that the outlook for the Southern is relatively promising because it is largely a passenger-carrying line. On the other hand, the traffic receipts of the other main line railways would be expected to show larger response in the event of a speeding up of general trade activity. Southern preferred is now **75½** and the yield is regarded in many quarters as very generous, as are the yields on L.M.S.R. junior preference stocks and L.N.E.R. first preference, but prices may not show much improvement while markets are inactive. Great Western ordinary reacted to **52¼** in sympathy with the general trend. Prior charge and debenture stocks were again steady. In other directions, London Transport "C" was active around **76¾**.

Among foreign railway securities San Paulo and those of other Brazilian railways were marked down on the political news from Brazil, but there was some recovery later. Argentine railway stocks were depressed and the debentures were also reactionary in tendency, notwithstanding better Great Southern traffic. Elsewhere, Antofagasta improved, and Nitrate Rails responded to the resumption of dividends. American railway stocks and Canadian Pacific were better on balance.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937-38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: May 11, 1938	Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	8.5.38	13,290	– 2,690	19	311,380	325,940	– 14,560	Ord. Stk.	29	10¼	9½	Nil
	Argentine North Eastern ..	753	7.5.38	8,809	– 713	45	404,392	391,288	+ 13,104	,,	19¼	6	3	Nil
	Argentine Transandine ..	—	—	—	—	—	—	—	—	A. Deb.	93½	60	75	5
	Bolivar	174	Apr., 1938	3,700	– 2,300	18	15,600	23,200	– 7,600	6 p.c. Deb.	9½	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	17	9	5½	9 1/16
	Buenos Ayres & Pacific ..	2,806	7.5.38	88,772	– 27,357	45	3,979,968	4,268,715	– 288,747	Ord. Stk.	17⅞	5½	5	Nil
	Buenos Ayres Central ..	190	23.4.38	$99,700	– $34,400	43	$4,968,800	$6,048,600	– $1,079,800	Mt. Deb.	41½	18	11½	Nil
	Buenos Ayres Gt. Southern	5,084	7.5.38	146,774	+ 8,561	45	6,762,902	6,782,896	– 19,994	Ord. Stk.	33¾	13½	11½	Nil
	Buenos Ayres Western ..	1,930	7.5.38	41,129	– 9,305	45	2,044,479	2,257,708	– 213,229	,,	31¾	11¼	8	Nil
	Central Argentine	3,700	7.5.38	99,442	– 54,203	45	5,428,096	6,928,104	– 1,500,008	,,	34¼	10¾	8½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	20½	4½	4	Nil
	Cent. Uruguay of M. Video	980	23.4.38	20,767	+ 1,298	43	777,833	759,346	+ 18,487	Ord. Stk.	67/32	2	2½	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	6¼	1½	1½	Nil
	Costa Rica	188	Feb., 1938	18,767	+ 1,741	35	197,323	142,134	+ 55,189	Stk.	38	27	26½	7 9/16
	Dorada	70	Apr., 1938	14,100	– 300	18	60,900	62,400	– 1,500	1 Mt. Db.	107	106	106	5 8/9
	Entre Rios	810	7.5.38	13,995	+ 2,841	45	640,364	575,965	+ 64,399	Ord. Stk.	19 7/16	6	5	Nil
	Great Western of Brazil ..	1,092	7.5.38	6,100	+ 490	19	142,400	148,700	– 6,300	Ord. Sh.	5¼	1⅛	1¼	Nil
	International of Cl. Amer...	794	Feb., 1938	$477,297	– $42,015	9	$964,439	$1,033,251	– $68,812	—	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	2/–	1/–	1½	Nil
	La Guaira & Caracas ..	22¾	Apr., 1938	5,055	– 1,150	18	19,730	23,080	– 3,350	Stk.	8½	6	8½	Nil
	Leopoldina	1,918	7.5.38	17,051	– 2,402	19	341,954	406,715	– 64,761	Ord. Stk.	9¼	3	2	Nil
	Mexican	483	7.5.38	$245,000	+ $7,300	19	$5,655,400	$5,684,900	– $29,500	,,	1½	¼	5/16	Nil
	Midland of Uruguay ..	319	Mar., 1938	10,313	+ 777	40	83,213	79,010	+ 7,203	,,	1⅞	1½	1½	Nil
	Nitrate	384	30.4.38	10,094	– 200	18	63,129	64,581	– 1,452	Ord. Sh.	3 1/16	2	2	Nil
	Paraguay Central	274	30.4.38	$3,040,000	– $780,000	44	$135,956,000	$125,163,000	+$10,793,000	Pr. Li. Stk.	84	79¼	65	9¼
	Peruvian Corporation ..	1,059	Apr., 1938	70,108	– 26,974	44	810,864	827,889	– 17,025	Pref.	14⅝	4½	3	Nil
	Salvador	100	30.4.38	¢16,750	– ¢9,250	44	¢990,575	¢1,061,208	– ¢170,633	Pr. Li. Db.	23½	21½	22½	Nil
	San Paulo	153½	1.5.38	37,542	+ 2,639	18	517,035	543,643	– 26,608	Ord. Stk.	98½	56	38	10½
	Taltal	160	Apr., 1938	3,030	+ 230	44	34,985	34,610	+ 375	Ord. Sh.	1 7/16	1 1/16	⅝	13 3/16
	United of Havana	1,353	7.5.38	20,492	– 11,970	45	1,128,005	1,234,285	– 106,280	Ord. Stk.	5⅝	31/32	2½	Nil
	Uruguay Northern	73	Mar., 1938	979	+ 179	40	8,430	9,292	– 862	Deb. Stk.	10	2	2	Nil
Canada	Canadian National	23,781	30.4.38	867,979	– 198,749	18	11,029,527	12,406,717	– 1,377,190	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	77	62½	62½	6⅞
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	101 7/8	94½	100½	4
	Canadian Pacific	17,186	7.5.38	479,400	– 62,000	19	8,595,200	9,248,800	– 653,600	Ord. Stk.	18	7¼	6	Nil
India†	Assam Bengal	1,329	20.4.38	35,557	– 14	3	70,530	70,056	+ 474	Ord. Stk.	86	73½	79	31 5/16
	Barsi Light	202	20.4.38	4,012	– 2,288	3	10,470	9,562	+ 908	Ord. Sh.	66½	46	60	8 5/16
	Bengal & North Western ..	2,107	30.4.38	88,161	– 8,414	4	235,695	283,647	– 17,952	Ord. Stk.	317	301	297½	6
	Bengal Dooars & Extension	161	30.4.38	3,583	– 84	4	10,964	10,086	+ 878	,,	100	84	85½	7
	Bengal-Nagpur	3,268	20.4.38	195,900	– 18,212	3	334,425	417,917	– 23,492	,,	101	89	91½	4⅝
	Bombay, Baroda & Cl. India	3,072	30.4.38	273,375	– 37,875	4	839,625	882,150	– 42,525	,,	113	110½	110½	5 7/16
	Madras & Southern Mahratta	2,967	20.4.38	171,525	+ 21,437	3	325,650	322,571	+ 3,079	,,	110	105	105½	8 1/16
	Rohilkund & Kumaon ..	571	30.4.38	18,006	– 1,542	4	54,935	60,651	– 5,716	,,	314	302	303½	5 15/16
	South Indian	2,531§	10.4.38	111,113	– 10,025	2	111,113	121,138	– 10,025	,,	103½	99½	102½	4⅝
Various	Beira-Umtali	204	Feb., 1938	87,194	+ 23,004	22	443,755	332,996	+ 110,759	—	—	—	—	—
	Egyptian Delta	620	10.4.38	5,800	– 131	2	5,800	5,931	– 131	Prf. Sh.	31/–	⅝	⅝	Nil
	Kenya & Uganda	1,625	Mar., 1938	279,680	– 4,212	13	802,157	852,979	– 50,822	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb	48⅛	43½	45½	7 11/16
	Midland of W. Australia ..	277	Mar., 1938	17,966	+ 4,558	39	131,005	119,597	+ 11,408	Inc. Deb.	98	93½	93½	4¼
	Nigerian	1,900	31.3.38	67,627	– 25,820	52	2,825,153	2,661,250	+ 163,903	—	—	—	—	-
	Rhodesia	2,442	Feb., 1938	391,093	+ 56,372	22	2,101,534	1,699,975	+ 401,559	—	—	—	—	-
	South Africa	13,263	30.4.38	612,445	– 17,628	5	2,611,306	2,660 299	– 48 993	—	—	—	—	—
	Victoria	4,774	Feb., 1938	794,106	– 61,204	35	6,392,472	6,705,843	– 313,371	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value

Diesel Railway Traction

Large Diesel Locomotives

THERE has been a noteworthy tendency during the past twelve months to develop the large diesel locomotive to powers of 1,800 b.h.p. and over, a tendency which is in contrast to the hitherto general and as yet unabated progress of the multi-unit set train for main line work, as exemplified by the Flying Hamburger.

It appears that as far as non-American practice is concerned, the culmination of the first stage in the construction of super-power diesel locomotives has been reached with the trials just concluded of the new Sulzer 4,000 b.h.p. locomotive for the Roumanian State Railways, and the virtual completion of the second P.L.M. 4,400 b.h.p. locomotive. No further locomotives of anything like this power are now under construction in Europe, although the Norwegian Parliament has authorised the purchase for the Oslo—Bergen line of a 4,000 b.h.p. diesel-electric unit by the State Railways.

Further development will probably await at least a year's regular running, and in this connection it is encouraging to note the reasonably successful operation of the first P.L.M. 4,000 b.h.p. locomotive since the summer of last year. Although it has not been included in any of the regular rosters, it has worked many thousands of miles on normal passenger trains, and we believe it is the intention to introduce it into regular service with the inauguration of this summer's timetables. Certain troubles have arisen in the electrical equipment and in the auxiliaries, but have not been regarded as indicating anything serious in the design or construction. Benefit might well be taken of experience with large diesel locomotives in America, where there are over a score of locomotives of 1,800 to 3,600 b.h.p., some of which have been at work for over two years.

Invariably the super-power main-line diesel locomotive is a twin-unit design, frequently with each half a duplicate of the other. The largest single-unit diesel locomotive of entirely separate construction has one ten-cylinder, 2,000 b.h.p. Busch-Sulzer two-stroke engine and is used for heavy short distance freight trains. Above that power, all the diesel locomotives operate in fast passenger service, except that the Roumanian locomotive will handle both passenger and freight trains over the mountainous and sharply-curved main line from Campina to Brassov. Both of the P.L.M. locomotives are composed of two similar portions, each with the 4-6-4 wheel arrangement, but whereas the Sulzer locomotive has in each half a twin-bank 2,200 b.h.p. engine driving a single d.c. generator through step-up gearing, the M.A.N.-engined locomotive has in each half a twin-bank engine of 2,200 b.h.p., each bank of which drives a separate generator. The continuous output per engine is 1,900 b.h.p. and the engine speeds permitted by the directly-regulated electric control system (with automatic controllers of the Simplex Cuénod type) are 420, 500, 630, and 700 r.p.m.

Electric transmission is still universal, usually with the incorporation of nose-suspended motors having flexible gear wheels, but sometimes with an individual axle drive of one or other of the cup spring types. As a result of the general operation in passenger service, the starting tractive effort is not unduly high, and the engine output is used to maintain the starting effort up to a relatively high speed—25 m.p.h. in the case of the P.L.M. locomotive. Auxiliary drives and power arrangements have in general followed the previous practices, as applied to 1,200-1,500 b.h.p. locomotives, but in America the position has been complicated by the increased lighting, cooking, and air-conditioning load of long trains, and separate auxiliary sets, up to a total of four of 50 kW. each, have been installed. In both European and American practice the number and variety of the auxiliaries generally cause more trouble and expense, and are responsible for more maintenance charges than either the main power plant or the mechanical portion.

Supercharging by exhaust-gas turbo blowers has been the greatest single step to making super-power diesel locomotives a practical proposition for British and Continental conditions. For a weight increment of 8 to 10 per cent., and a price increase of nearly the same order, the continuous power output can be raised by 35 to 40 per cent. with practically no additional complication and without adding to the cooling equipment. Moreover, this increment is obtained without adding to the bulk of the power plant, a critical advantage which enables a 2,000 b.h.p. engine to be mounted comfortably within the limits of the loading gauge.

By the use of the exhaust gas supercharger in conjunction with a four-stroke engine, the weight of diesel locomotives in full working order has been brought down as low as 115 lb. per b.h.p. In the non-supercharged two-stroke American locomotives the weight is 124 to 145 lb. per b.h.p. when stainless steel is used for the body construction.

European and American high-power diesel locomotives, apart from the prevalence of the twin-vehicle formation, offer a series of contrasts in their design. In Europe two four-stroke supercharged engines, each of great power, are incorporated; in America three to six non-supercharged two-stroke engines are used for powers of 3,000 b.h.p. or more, and two for 1,800 up to 3,000 b.h.p. The use of the two-stroke Winton engine of 900 or 1,200 b.h.p. probably was dictated by the desire to use an existing engine and thus eliminate a period of experimental running and obviate any delay waiting for spare parts. But it leads to complication, and in the new triple-unit 5,400 b.h.p. locomotives of the Union Pacific Railroad there are 72 sets of cylinders and driving sets compared with 24 sets on the P.L.M. 400 b.h.p. locomotive. Auxiliaries are provided with power by separate small engine-generator sets in American locomotives, whereas elsewhere the general practice is to have an auxiliary generator working from the main generator shaft. Finally, in Europe the locomotive is built on a rigid frame construction, whereas in the U.S.A. the double-bogie type is used exclusively.

A Recent English Railway Oil-Engine Model

Four-stroke design for medium power

DEVELOPED from the 180 b.h.p. six-cylinder engine installed in an experimental railcar in 1933, and embodying the results of experience gained with the larger and heavier engines in the L.M.S.R. oil-electric shunting locomotives, the new English Electric railcar diesel engine as installed in the Ceylon Government Railways' trains is a modern example of medium-weight construction. When the engine is used in conjunction with a main generator, as in oil-electric vehicles, the combination is mounted on a common bedplate which is supported by a three-point suspension having rubber cushioning blocks, but the general arrangement drawings here reproduced show an engine suitable for base mounting.

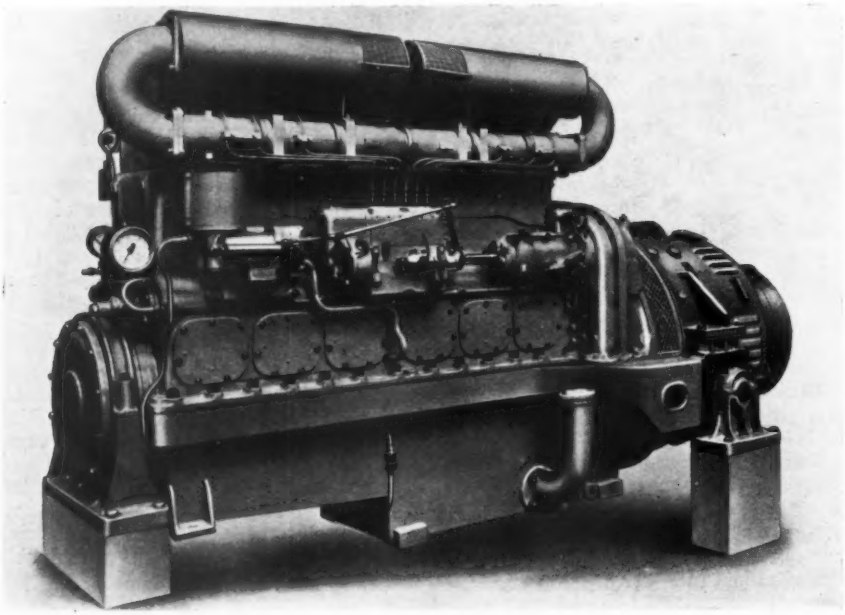
Built on the direct injection principle for variable-speed operation, the new engine has six cylinders with a bore of 6·0 in. and a stroke of 8·0 in., and at the top speed of 1,500 r.p.m. has a piston speed of 2,000 ft. per min. From the accompanying performance curves it will be seen that the maximum output is 220 b.h.p. at 1,500 r.p.m., corresponding to a brake m.e.p. of 85 lb. per sq. in., but in the Ceylon trains the governor was set for the engine to give a normal output of 180 b.h.p. at 1,350 r.p.m. The combustion chamber is of the open type and the fuel is injected directly through a multi-hole nozzle in the centre of the cylinder head. A C.A.V.-Bosch fuel pump is used and it is driven by a side shaft operated through helical gears from the camshaft; the drive is taken through the emergency governor. The combustion air is led through oil-wetted cleaners and silencers into the induction manifold.

Constructional Features

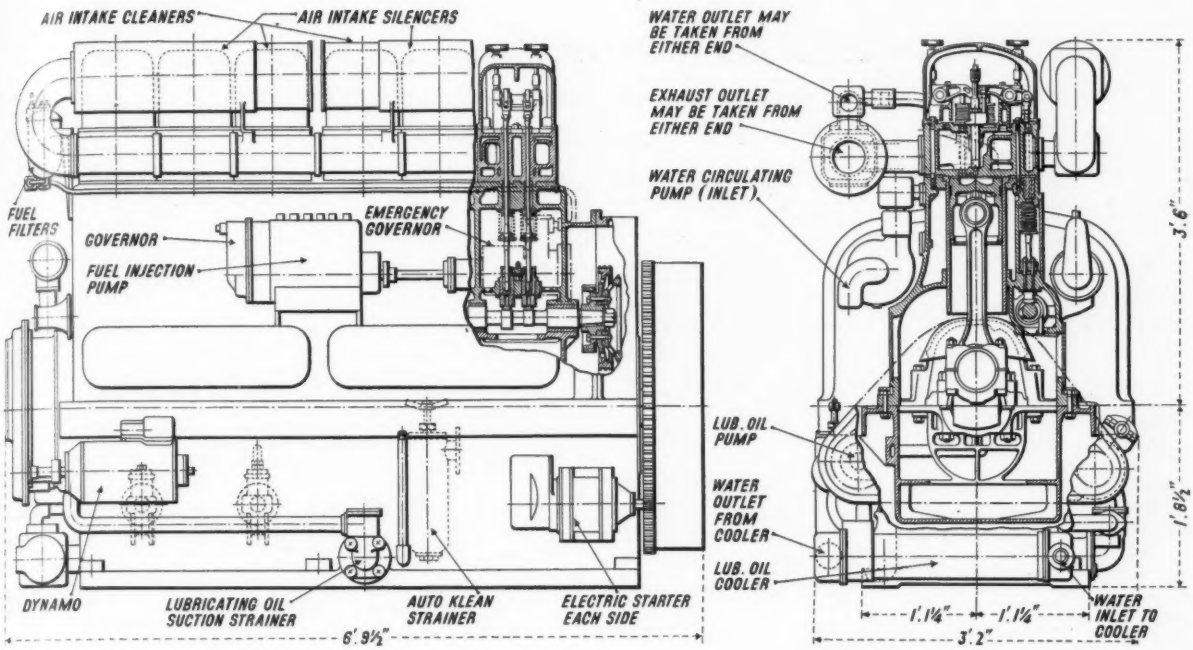
The crankcase and cylinder block are formed as an integral iron casting and have wet-type cylinder liners inserted. Cast steel is the material used for the combined bedplate and sump. The lubricating oil reservoir in the sump contains the immersed oil circulation pump, which is chain-driven from the flywheel end of the crankshaft. The delivery from the pump, at a normal pressure of 35-40 lb. per sq. in., passes through a high-pressure relief-valve to a radiator-type internal cooler, and thence through an Auto-Klean strainer located on the exhaust side of the bedplate, and through a cored passage in the side of the bedplate to the main journals. The use of this arrangement obviates high-pressure oil pipes inside the crankcase. A low-pressure relief valve maintains a pressure of 20 lb. per sq. in. at the inner end of the cored passage, and oil tapped from this passage is passed through a reducing valve and led at a pressure of 5 lb. per sq. in. to the overhead valve gear and to the camshaft.

Separate cast-iron cylinder covers are used. They, and the whole of the rocking gear, are enclosed in easily-removable cast aluminium covers, and they each carry two inlet and two exhaust valves operated from a single camshaft located in the upper part of the crank chamber and driven from the main shaft by a triple Renold chain. The camshaft is of casehardened steel with integral cams which run in oil baths. The push rods are spring-loaded by a dash-pot arrangement, thus permitting the use of lightly-stressed valve springs and contributing to the silent running of the engine. The aluminium alloy pistons are fitted to drop-forged steel connecting rods through gudgeon pins running on phosphor-bronze bushes; the rods have separate steel shells, whitemetal-lined, in the four-bolt big-ends. The pistons, connecting rods, and main bearing caps and shells can be withdrawn through the two large inspection doors on each side of the crankcase.

A vibration damper is fitted to one end of the heat-treated alloy steel crankshaft, which itself is not balanced by prolongation of the crank webs, and is hollow-bored only in the crankpins. The cooling water circulation is maintained by an engine-driven pump above the crank



General view of English Electric six-cylinder 6H type engine developing a maximum output of 220 b.h.p. at 1,500 r.p.m. For diesel-electric traction applications the bedplate of the engine is extended aft to carry the main generator, and the whole unit is on a resilient three-point suspension

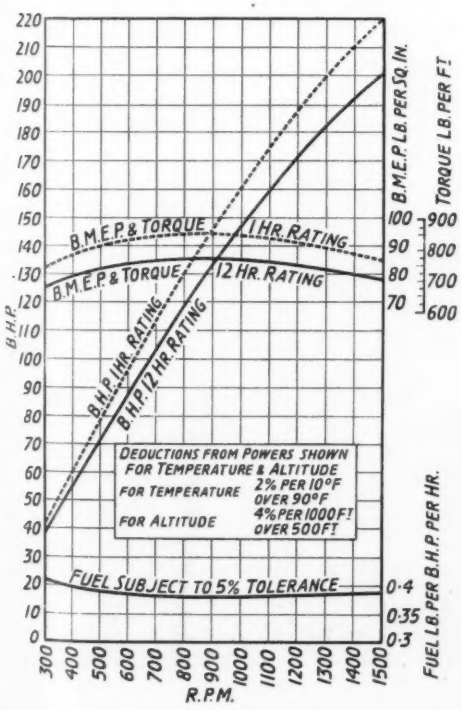


Sectional arrangement of English Electric 220 b.h.p. engine (base-mounted model)

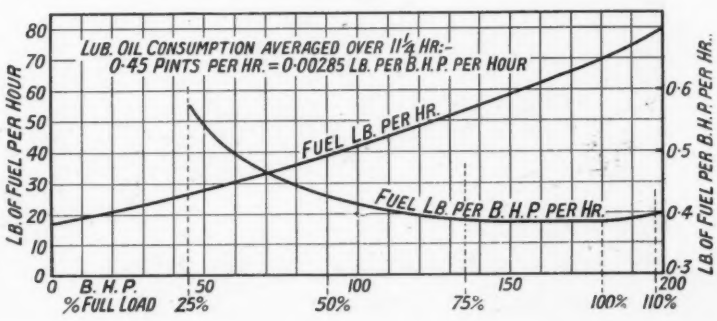
chamber, which delivers to points high up in the water jackets, and is led by cored passages in the cylinder covers to flow first round the fuel injector body sleeve. The water itself is cooled in external radiators mounted on the railcar, but it also is used to cool the lubricating oil in the sump. At the flywheel end of the main shaft various auxiliary drives, such as the camshaft, fuel pump and governor shaft are chain driven.

The governor is designed to govern the engine at three separate speed settings, the full load speeds being 580 r.p.m., 900 r.p.m., and 1,350 r.p.m. respectively. The governor speed settings are effected by oil-operated pistons; the admission of oil to the pistons is under the control of solenoid-operated valves, which in turn are controlled by the master controller in the driver's cab.

A pleasing feature of the engine's performance, as may be noted from the curves presented on this page, is that from 120 to 200 b.h.p., that is from 65 per cent. to over 100 per cent. of the rating given to the Ceylon engines, the fuel consumption is below 0·4 lb. per b.h.p. hr.; further, from 140 to 180 b.h.p. the fuel consumption line is virtually flat, and even when plotted against speed, as in the left-hand graph, it does not depart appreciably from the horizontal. The tested lubricating oil consumption follows best modern practice in being less than one per cent. by weight of the fuel consumption.


B.H.P.
B.M.E.P. LB. PER SQ. IN.
TORQUE LB. PER FT.
FUEL LB. PER B.H.P. PER HR.
R.P.M.
B.M.E.P. & TORQUE 1 HR. RATING
B.M.E.P. & TORQUE 12 HR. RATING
B.H.P. 1 HR. RATING
B.H.P. 12 HR. RATING
DEDUCTIONS FROM POWERS SHOWN FOR TEMPERATURE & ALTITUDE
FOR TEMPERATURE 2% PER 10°F OVER 90°F
FOR ALTITUDE 4% PER 1000 FT OVER 500 FT
FUEL SUBJECT TO 5% TOLERANCE

Power and fuel consumption curves of the latest English Electric railcar engine



FURTHER IMPRESSIONS OF OVERSEAS TRANSPORT, NO. 5*

Australia revisited

By A. W. ARTHURTON, M.Inst.T.

ON this second visit to Australia I was impressed by the increased use of railcars and diesel trains in the various States. They are peculiarly suitable to Australian conditions where extensive areas of sparsely populated country require comparatively fast, regular services of light units, rather than standard trains or the slow mixed trains which have done duty for so long, and of recent years have afforded an opportunity to the fast, mobile road-motor vehicle to compete so successfully. These new railcar trains mark a step forward in Australian railway travel, and their comfort, convenience and speed have already made the services very popular with the public.

The provision of air-conditioned diesel trains like the Silver City Comet [described in the October 29, 1937 issue of this Supplement—ED.] is the latest example of the progressive policy of the New South Wales Railways. On the Victorian Railways, as a result of experience gained with diesel engines in railcars, a further five single-ended cars and one double-ended car were fitted with this type of engine last year and expected economies have been fully realised.

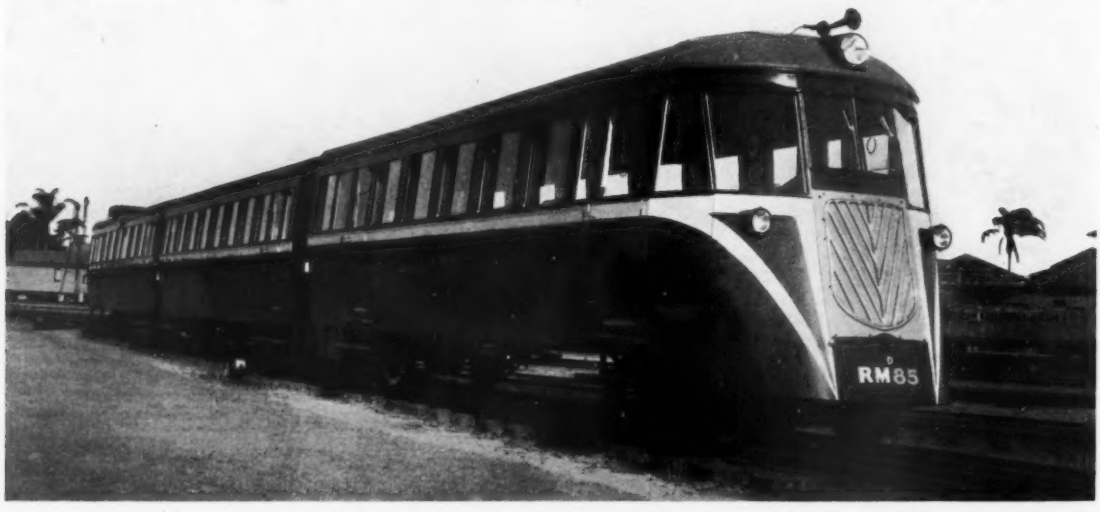
In no State in Australia are railcar services being operated so extensively as in Queensland where the railcar mileage last year amounted to 1,776,470, or 16 per cent. of the total steam traffic train-miles run. These services operate principally in country districts and provide transport for passengers, parcels, mails, and in some cases goods. On two isolated lines in the northern portion of the State and on 134 miles of a branch line in the north west the services are wholly operated by railcars. Of the 67 units in service, 56 are of the petrol type ranging from 45 to 150 b.h.p. The eleven diesel railcars in service comprise four of 50 b.h.p., six of 102 b.h.p., and one of 130 b.h.p., the Gardner engine being the favourite.

The experience gained with the use of diesel units has been satisfactory, and three new 102 b.h.p. streamlined motor trains are now in course of construction. In addition, three diesel engines of 50 b.h.p. and five of 102 b.h.p. for the equipment of other cars have been purchased, and orders have been placed for a further six 102 b.h.p. engines.

The diesel trains of 102 b.h.p. are equipped with Gardner engines mounted on chassis designed and constructed in the railway workshops. Power is transmitted through a four-speed gearbox and a reversible final drive manufactured in Australia. The body of the power unit is 30 ft. in length and 8 ft. in width and is of standard steel construction. The total weight of the train is 34 tons. The train is tuscan red in colour with a straw band at the waist rail. The windows are of the sliding frameless glass type and are provided with blue poplin curtains. The seats are arranged on each side of the centre aisle and accommodate two passengers each. Seats in the trailers are of the reversible roll-over type, the seat and back cushions being identical and interchangeable. The interiors of the cars are grained to window level and finished in gloss white above, while the upholstery is carried out in black leather. A fully equipped lavatory is provided in each train. The vehicles are insulated in the ceiling against heat, and in the floor against sound, also in the walls. Air brakes are applicable to all vehicles and a pull bell system is installed for use by passengers in emergency and when desiring to alight at other than scheduled stops.

On the Western Australian Railways six diesel railcars have been introduced. They are the most up to date obtainable and great care has been taken to give the maximum of comfort and efficiency. The cars are fitted with a 140 b.h.p. Armstrong-Saurer diesel engine direct-coupled to an electric generator and mounted on a common bedplate. They have a cruising speed of from 40 to 45 m.p.h., consequently existing passenger schedules have been considerably curtailed.

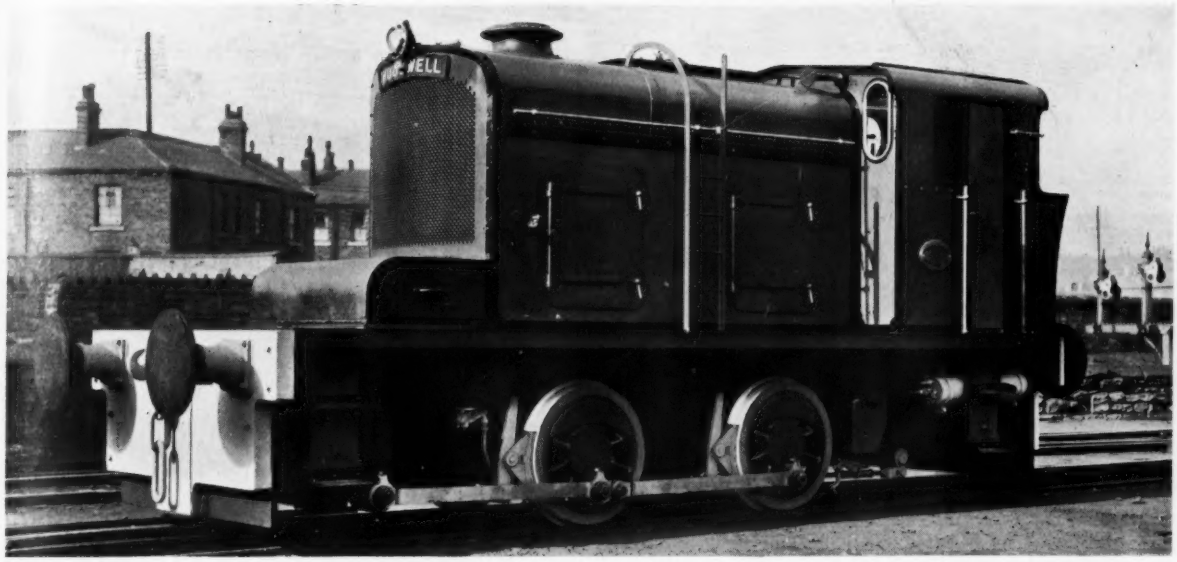
* The previous four instalments will be found in recent issues of THE RAILWAY GAZETTE.



100 b.h.p. Gardner-engined diesel-mechanical train, Queensland Government Railways

A DIESEL SHUNTER FOR SOUTH WALES

Novel engine and transmission devices incorporated



150 *b.h.p. three-speed diesel-mechanical standard-gauge shunter*

AMONG the constant flow of diesel-mechanical shunting locomotives emanating from the works of Hudswell Clarke & Co. Ltd. is a 28-ton unit just built for the Llandarcy refinery of the Anglo-Iranian Oil Co. Ltd., and is of more than the usual interest because of the precautions taken to eliminate sparks and by reason of the incorporation of the new Hudswell Clarke Tele-change preselective gear-changing control.

Power is produced by an eight-cylinder four-stroke Gardner engine normally developing 204 b.h.p. at 1,200 r.p.m. in cylinders 5½ in. by 7¾ in., but in this case limited to 150 b.h.p. at 1,000 r.p.m. The engine is started by a Gleniffer compressed air motor using air at a pressure of 350 lb. per sq. in., and another fitting is a Visco air filter of unusually large size. Cooling of the engine circulating water and the engine lubricating oil is effected in a Reliance radiator located on the front of the bonnet, and provided with a fan belt-driven from the transmission system. For the elimination of sparks from the engine, the exhaust is passed through a vortex water-spray silencer made by William Alexander, of Glasgow; the water supply to this equipment is maintained by a separate belt-driven pump drawing water from a tank independent of the engine cooling water circuit. The exhaust is led into the base of the silencer, and in moving upwards is passed through a cone of fine water spray moving in the opposite direction; after this the exhaust is passed over fixed inclined vanes which impart a centrifugal force to it, and cause any suspended particles to be thrown into an ashpan. Fibrous non-sparking brake blocks and Ferodo facings on the buffer heads and buffer beams are additional means of guarding against sparks. Incidentally, the Alexander vortex spark arrester assists in making the running of the locomotive very silent.

The first constituent of the transmission is a Vulcan-Sinclair fluid coupling fitted with an idling drag eliminator, and thence the torque is taken to a three-speed preselective self-changing gearbox having an auxiliary clutch and baulking rings. The change-speed mechanism is of Hudswell Clarke's so-called "Tele-change" type, which not only gives foolproof preselection, but enables an extremely rapid gear-change to be made without serious loss in torque, owing to the air-operated auxiliary clutch taking up the drive, and without any risk of overspeeding the engine or subjecting the transmission to undue shocks. The baulking rings act in the nature of synchronisers. Tests on a 1 in 30 up-grade showed that a time of 1½ sec. was sufficient to effect a change from first to second gear, and 2 sec. for a change from second to third. At the normal engine speed of 1,000 r.p.m., the track speeds in the three gear steps are 3, 5, and 9 m.p.h. in either direction. The maximum tractive effort is 15,000 lb.

Starting air and air for the Westinghouse brake and sanding apparatus is provided by a single Reavell compressor. The air is first compressed up to a pressure of 80 lb. per sq. in. for the brake and sanding gear, and then a relay valve comes into action to allow compression to be continued up to the pressure of 350 lb. per sq. in. required for the starting equipment. There is an emergency hand-operated compressor which will fill a small reservoir.

The final drive to the 36-in. wheels is through a jack-shaft and rods. The wheelbase is 5 ft. 9 in., the length over buffers is 25 ft. 6 in., the height 11 ft., and the width 8 ft. 6 in. The cab controls are suitable for driving from either side. To guard against spark-production, the electric lighting system is entirely from a battery, and there is no dynamo on the locomotive.

CEYLON DIESELS.—The four three-car English Electric diesel trains of the Ceylon Government Railways (see issue of this Supplement for February 18), are proving very popular, and multiple-unit operation has been in force during holiday periods. One of these trains was recently reported to have been cut in two by a falling tree.

THE BURLINGTON ZEPHYRS

Their design, maintenance and service with particular reference to the power plants

By E. F. WEBER

Superintendent of Automotive Equipment, Chicago, Burlington & Quincy Railroad

THE first diesel streamlined train in America was built in 1933-34 for the Burlington Lines by the E. G. Budd Manufacturing Co. of Philadelphia. The railroad now has eight of these stainless steel streamlined trains engaged in service as shown in the accompanying table, and they make 13½ per cent. of the total passenger train miles of the Burlington system. Each of the three- and four-car Zephyr trains is propelled by a 660 b.h.p. eight-cylinder vertical Winton engine. As 60 h.p. is absorbed at full load by the auxiliaries, these trains are generally spoken of as 600 b.h.p. sets, this being the power available for absorption by the generator. The two Twin Cities* and two Denver Zephyr trains are hauled by diesel-electric locomotives (or power cars) with a maximum power output of 1,800 and 3,000 b.h.p. respectively, and make up to seven and 12 vehicles respectively, including the power units. The 1,800 b.h.p. locomotives on the Twin Cities run are equipped with two 12-cylinder vee 900 b.h.p. diesel engines each, and the 3,000 b.h.p. locomotives on the Chicago—Denver run have two 900 b.h.p. engines in the first unit and a 16-cylinder vee 1,200 b.h.p. engine in the second unit, connected for multiple-unit operation.

The original Zephyr has ordinary passenger accommodation with a buffet, and has a large amount of mail and baggage space. The Sam Houston and Ozark State Zephyrs were originally both three-car trains and ran on the Twin Cities service until near the end of 1936, when they were replaced by the seven-car trains; both were then provided with a fourth car. The Mark Twain has always been a four-car rake, but carries passengers in the third and fourth vehicles only; the second car and the rear of the power car are devoted to baggage and mails. The present Twin Cities Zephyrs, Pegasus and Zephyrus, have ordinary day accommodation supplemented by a dining service and parlour and observation cars. The two Denver Zephyrs are of a more *de luxe* character, and have dining and sleeping saloons as well as lounges and a cocktail bar. All the Zephyr trains are single-end drive and are articulated, although not always as one unit. The six revenue cars of the present Twin Cities trains are articulated as one unit, and are hauled by a separate power car or locomotive. The ten revenue coaches of the Denver Zephyrs are arranged as six units, some comprised of single body units, and others of two and three body units.

The accumulated mileage of the eight Burlington Zephyr trains now amounts to well over four million, with an availability of 95·4 per cent. The nominal aggregate yearly mileage is approximately 2,150,000, and the daily total 5,900 miles.

The Engine

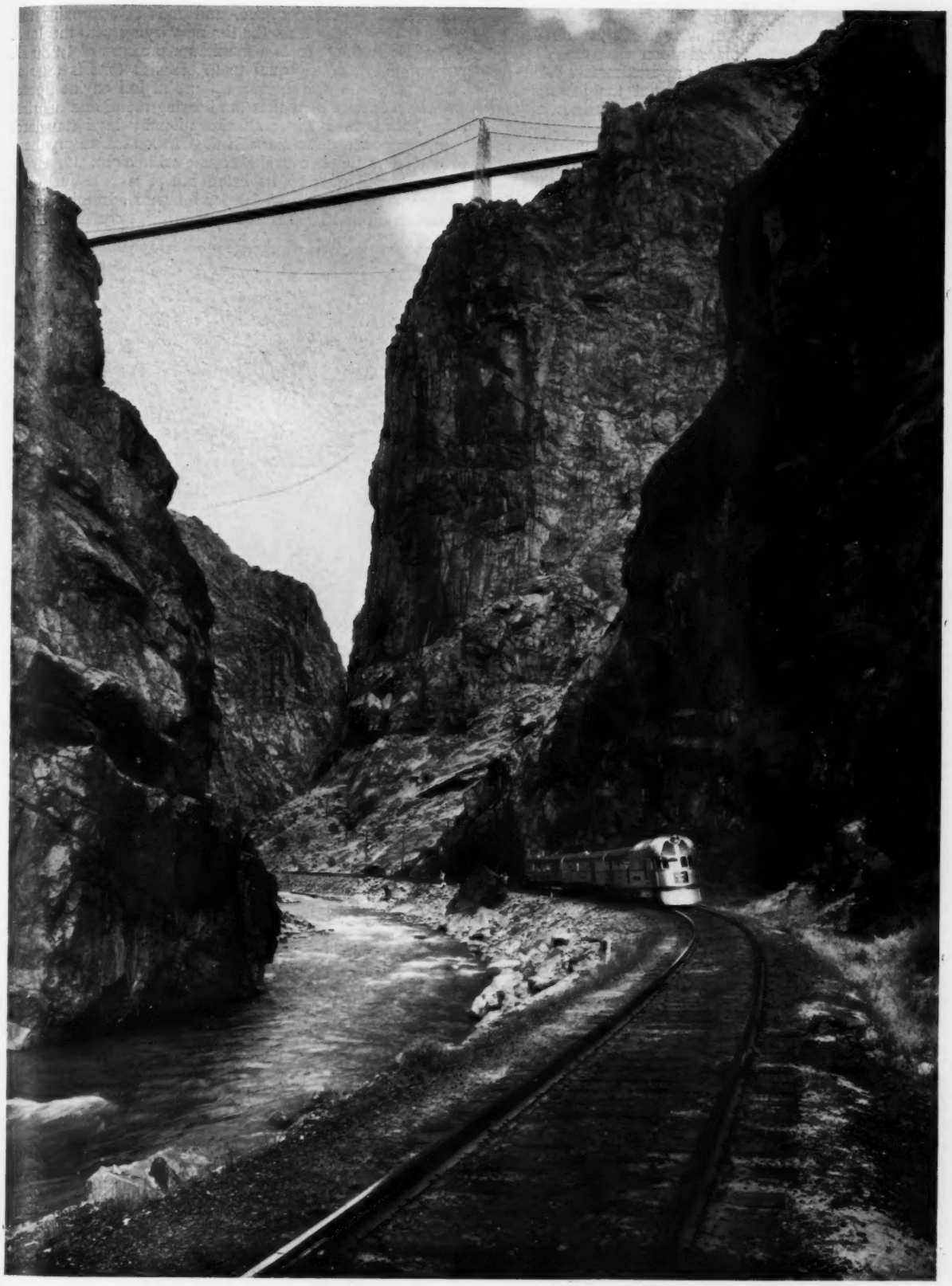
The two-stroke diesel engine incorporated in all the Zephyr trains was built at the Winton plant in Cleveland, and it is believed that the engine in the original Zephyr was the first of its kind in the world in which the working loads on cylinder head and crankshaft were

[* The "Twin Cities" are Minneapolis and St. Paul, and the service referred to connects them with Chicago.—ED.]

STAINLESS STEEL DIESEL TRAINS, CHICAGO, BURLINGTON & QUINCY RAILROAD

Railroad No.	Name	No. of cars, including power cars	Service	Normal daily mileage	B.H.P.	Weight empty, but with supplies	Accommodation	Max. No. of passengers	Overall length	Date put into regular service
						Eng. tons			Ft. In.	
9900	Original Zephyr	3‡	Lincoln – Omaha – Kansas City	500	660	98	Ord. pass., buffet, 22 tons mail and baggage	72	196 0	November, 1934
9901	Sam Houston ..	4§	Houston – Dallas – Fort Worth	568	660	128	Ord. pass., dining, baggage	112	280 0	April, 1935
9902	Ozark State ..	4§	St. Louis–Mexico–Kansas City	558	660	128	Ord. pass., dining, baggage	112	280 0	April, 1935
9903	Mark Twain ..	4	St. Louis–Burlington	442	660	128	Ord. pass., dining, mail and baggage	92	280 0	November, 1935
9904*	Pegasus ..	7	Chicago–St. Paul–Minneapolis	882	1,800	294	Ord. pass., dining, baggage	245	467 4	December, 1936
9905*	Zephyrus ..	7	Minneapolis – St. Paul–Chicago	882	1,800	294	Do.	245	467 4	December, 1936
9906†	Silver King and Silver Queen	12	Chicago–Denver ..	1,034	3,000	581	Sleeping, dining, lounge, baggage	309	883 9	November, 1936
9907†	Silver Knight and Silver Princess	12	Chicago–Denver ..	1,034	3,000	581	Do.	309	883 9	November, 1936

* Present Twin Cities Zephyrs. † Denver Zephyrs. ‡ Fourth car to be added this year. § Originally three-car trains



THE ORIGINAL DENVER ZEPHYR PASSING THROUGH THE ROYAL GORGE

tied together through a weld. The crankcase is of a solid welded construction, utilising flame-cut shapes in which full dependence is placed upon the welded joint. The working load on this joint is approximately 9,500 lb. and breakdown tests have proved that the joints themselves would not fail until subjected to stresses around 212,000 lb.

Through refinement in design, use of the unit fuel injection system, the two-stroke principle and welded steel structures, these engines have been built to a weight ratio of approximately 20 lb. per b.h.p., the weight of the 660 b.h.p. eight-cylinder engine being 13,420 lb. empty. Rigidity has not been sacrificed; in fact, tests on bearing deflections in the fabricated steel crankcases, together with the behaviour during machining operation, have shown such crankcases to be far more rigid than any heretofore used in a diesel engine. This point is of great importance because rigidity determines the life of the main bearings and limits the wear of all moving parts that are contained in the structure.

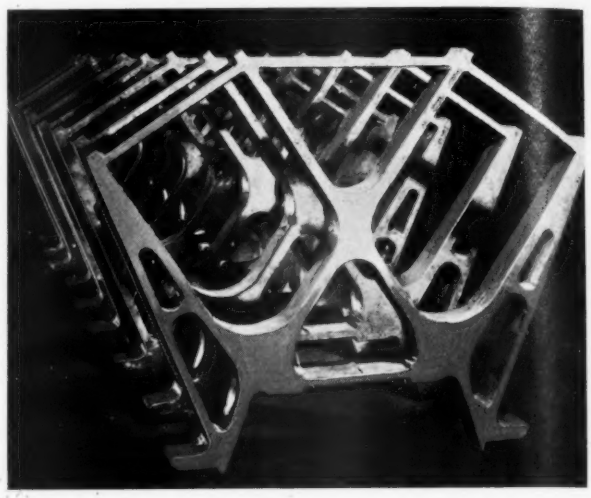
Maintaining rigidity and cutting weight are directly contradictory, since the modulus of elasticity or the rigidity factor of steel or any other material is a fixed quantity. To accomplish both low weight and high rigidity, the sections must be carefully distributed. In other words, enough steel to do the work must be placed in exactly the most advantageous manner. Recent experiments indicate that in place of the flame-cut members dependence is being placed on alloy steel plates in combination with forged alloy steel feet members. Indications are that this construction is approaching an ideal. The main achievements of welded steel diesel crankcases have been strength, light weight and rigidity. The paramount advantage of steel, when properly used, is the possibility of fusing many pieces of steel together into an integral whole. Modern weld metal can now be produced with an ultimate strength of 100,000 lb. per sq. in. together with the requisite ductility to ensure plastic behaviour. Some time ago a piston in one of the 16-cylinder engines broke, tearing the cylinder liner to pieces and bending part of the welded steel structure in the crankcase. This failure conclusively proved that the welded joints were much stronger than the metal which they joined, further proving that the weld can be made stronger not only with respect to its tensile properties but also as to its dynamic properties.

All cylinders in the Winton diesel engines are of the same sizes as far as bore, stroke and fuel injection are concerned, the only difference being that the 660 b.h.p. engines in the four small size Zephyrs have eight cylinders in line while the 900 b.h.p. and 1,200 b.h.p. engines in the larger Zephyrs are of the vee type with 12 and 16 cylinders in two banks. They have the following characteristics:

R.p.m.	750
Bore and stroke	8 in. × 10 in.
B.h.p. per cylinder	75
Compression ratio	16 : 1
Piston clearance under head	0·05 in.
Approximate compression pressure	600 lb. per sq. in.
Temp. at maximum compression	1,000 to 1,100° F.
Fuel feed pump pressure	20 lb. per sq. in.
Injector pressure at nozzle, variable according to load and speed (approx.)	15,000 lb. per sq. in.
Exhaust gas temperature (approx.)	400° to 550° F.
Brake m.e.p.	79 lb. per sq. in.
Dia. of crankpins	6·0 in.
Dia. of main bearings	6·75 in.
Designed bearing pressure	1,900 lb. per sq. in.
Maximum firing pressure	850 to 1,200 lb. per sq. in.
Piston area	50·27 sq. in.
Total compression load	30,162 lb.
Total firing load (at 1,200 lb. per sq. in.)	60,324 lb.

Fuel injection at full load starts at approximately 15 deg. before top dead centre, and ends at approximately 5 deg. after dead centre, the timing varying with the load. When the fuel ignites at a maximum pressure of 1,200 lb. per sq. in., a force equal to 27 English tons is exerted upon the piston 750 times a minute at full engine speed, by which it is evident that the bearing metal and lubricating system must be of an exceptionally high standard.

Dynamometer tests made in the Winton laboratory have proved that the two-stroke engine with eight, 12, or 16 cylinders will develop its rated b.h.p. with a fuel consumption as low as 0·37 lb. per b.h.p.hr., burning grade 2 furnace oil of 18,500 B.T.U. per lb. heat content. How-



Welded steel crankcase of 660 b.h.p. straight-eight Winton engine

ever, in road service where conditions are not always so favourable, it is considered that 0·4 lb. of grade 2 furnace oil is a fair average. Such an engine will then have a theoretical thermal efficiency of 41·45 per cent., a mechanical efficiency of 83 per cent., a brake thermal efficiency of 34·38 per cent., and with an 80 per cent. efficient transmission, the overall efficiency from fuel to rail will be 27·5 per cent. In comparison, a good petrol engine for railway work would require 0·64 lb. of fuel of 19,000 B.T.U. per lb. heat content for each b.h.p. hr. at the engine shaft. Such an engine would have a theoretical thermal efficiency of 24·65 per cent., a mechanical efficiency of 85 per cent., a brake thermal efficiency of 20·93 per cent., and, with an 80 per cent. efficient transmission, an overall efficiency from fuel to rail of 16·75 per cent., which makes the overall efficiency of the diesel engine 61 per cent. greater than its predecessor, the petrol engine.

In order to obtain the greatest amount of power from the fuel in a two-stroke engine, it is essential that an adequate supply of air be available for forcing the products of combustion into the atmosphere. The two-stroke Winton engine has a Roots type spiral lobe blower built into the engine which forces 133 per cent. of the cylinder volume of air to the entire bank of cylinders at approximately 3 lb. pressure. The volumetric capacities of the scavenging blower for the eight, 12, and 16-cylinder engines are as follow:—

8-cylinder engine	2,500 cu. ft. per min.
12-cylinder engine	3,500 " " "
16-cylinder engine	4,700 " " "

By this it is evident that scavenging and combustion

are effected in a highly satisfactory manner, and are no doubt the main reasons why the exhaust gas from this engine is practically invisible and odourless. The engine cooling problem is also of primary importance, especially during the summer season.

Based on 0·4 lb. of fuel per b.h.p. hr., burning grade 2 furnace oil of 18,500 B.T.U. heat content, the power factor of the 3,000 b.h.p. Denver Zephyr locomotive averages 76 per cent., although under actual service conditions it is necessary to consider the maximum or 100 per cent. output, as frequently the reserve power is needed, especially on long up-grades and during stormy weather. Under such conditions in a diesel engine burning fuel with 18,500 B.T.U. heat content at a rate of 0·4 lb. per b.h.p. hr., the heat to be dissipated amounts to 7,400 B.T.U. per b.h.p. hr. Therefore the necessary heat dissipation in the various locomotives is as follows:—

660 b.h.p.	locomotive	4,400,000	B.T.U. per hr.
900 ,,	,, ...	6,660,000	,, ,,
1,200 ,,	,, ...	8,880,000	,, ,,
1,800 ,,	,, ...	13,320,000	,, ,,
3,000 ,,	,, ...	22,200,000	,, ,,

The summer heat on parts of the Burlington Lines exceeds 110° F. When such extreme heat prevails the amount of airflow required to maintain the engine cooling system at a maximum temperature of 175° F. is here given in cu. ft. per min. airflow through the radiators:—

	Radiators	Engine Intake	Traction Motors	Total
660 b.h.p.	26,100	2,300	4,000	32,400
900 ,, ...	39,150	3,460	4,000	46,610
1,200 ,, ...	52,200	4,600	8,000	64,800
1,800 ,, ...	78,300	6,920	8,000	93,220
3,000 ,, ...	130,500	11,520	16,000	158,020

The actual number of cu. ft. of airflow per minute forced into the engine room by the fans is:—

660 b.h.p. ..	Two 26-in. fans at	1,950 r.p.m.	32,500 cu. ft.
900 ,, ..	,, 34-in. ,,	1,250 ,,	48,000 ,,
1,200 ,, ..	Four 26-in. fans at	1,950 r.p.m.	65,000 ,,
1,800 ,, ..	,, 34-in. ,,	1,250 ,,	96,000 ,,
3,000 ,, ..	,, {26-in. / 34-in.}	,, —	161,000 ,,

Engine Operating Experience

The bearing metal first used in the original Zephyr was a copper alloy known as Allison's metal. This material did well, with the exception that it was a little too hard and tended to wear circumferential ridges in the crankshaft journals. However, no serious trouble occurred during the mileage of 288,000 made while these bearings were in position. It was then decided to try the bearing material still in use, Satco metal, which is primarily an alloy of lead, barium and calcium, containing approximately 98 per cent. lead. Other elements are used in the manufacture of the metal which are not present in the ingot. The alloy has a low frictional coefficient at high melting point, toughness, and resistance to deformation. The melting point of Satco is 600° F., while genuine babbitt melts at 465° F. The higher melting point of Satco allows the bearings to be used for severe service where babbitt would become soft and fail. In addition, the superior toughness of Satco metal prevents the formation of premature cracks due to fatigue. Practically no bearing trouble has occurred in a train mileage of nearly 4,000,000 with this metal.

At the beginning, considerable trouble was experienced with the aluminium alloy pistons, which expanded, seized, and resulted in the scoring of both the piston and cylinder liner. After considerable research slight changes in the heat treatment and design of the pistons were made, with gratifying results. With the old style pistons a number of cylinder liners were removed and replaced on account of fracture or scoring, but there have been no replacements from these causes with the present pattern of piston.

The cylinder head in the 660 b.h.p. Winton engine contains four exhaust valves which occupy a great part of the 50·265 sq. in. area. That, together with the core for water circulation, leaves very little metal between the valve ports, hence some of the heads have failed through the valve ports. The metallurgists and foundries have been diligently working on this problem and considerable progress has been made in the construction and distribution of the metal. So far none of the fractures in the heads have been serious enough to produce a road failure.

The fuel injectors also caused some trouble in the first engines, for the reason that if one injector failed the fuel line became air-locked and fouled the adjacent injectors. That trouble has been entirely eliminated by the installation of a return fuel line. When it is found that an injector is not functioning properly during the run, that particular cylinder is cut out by removing the push rod and substituting a so-called crutch, which holds the injector plunger stationary at a point where no fuel or compression can pass. Then on arrival at the terminal the defective injector is replaced, and this usually requires about 25 min.

660 b.h.p. eight-cylinder vertical two-stroke Winton engine

Maintenance of the Denver Zephyrs

When the Denver Zephyr trains arrive at the terminals after their 1,034-mile runs, the maintainer is there to ask the driver questions regarding the performance of the power units, and also to look over the reports made by the drivers who handled the train on the previous divisions of the run. After the passengers, mail, and baggage have been unloaded, the train is promptly moved to the maintenance pit where inspections and running repairs are made during the eight-hour lay-over period. One of the first duties of the engine maintenance personnel is to remove the air duct covers for inspection of the pistons and rings, which can be seen through the air scavenging ports in the cylinder liners. When it is found that a ring is tight in its groove, or a piston shows signs of blackening due to blow-by, the piston is promptly removed for cleaning and for the application of new rings if these should be necessary.

Since it is necessary to take off the cylinder head for removal of the piston, the head is thoroughly inspected

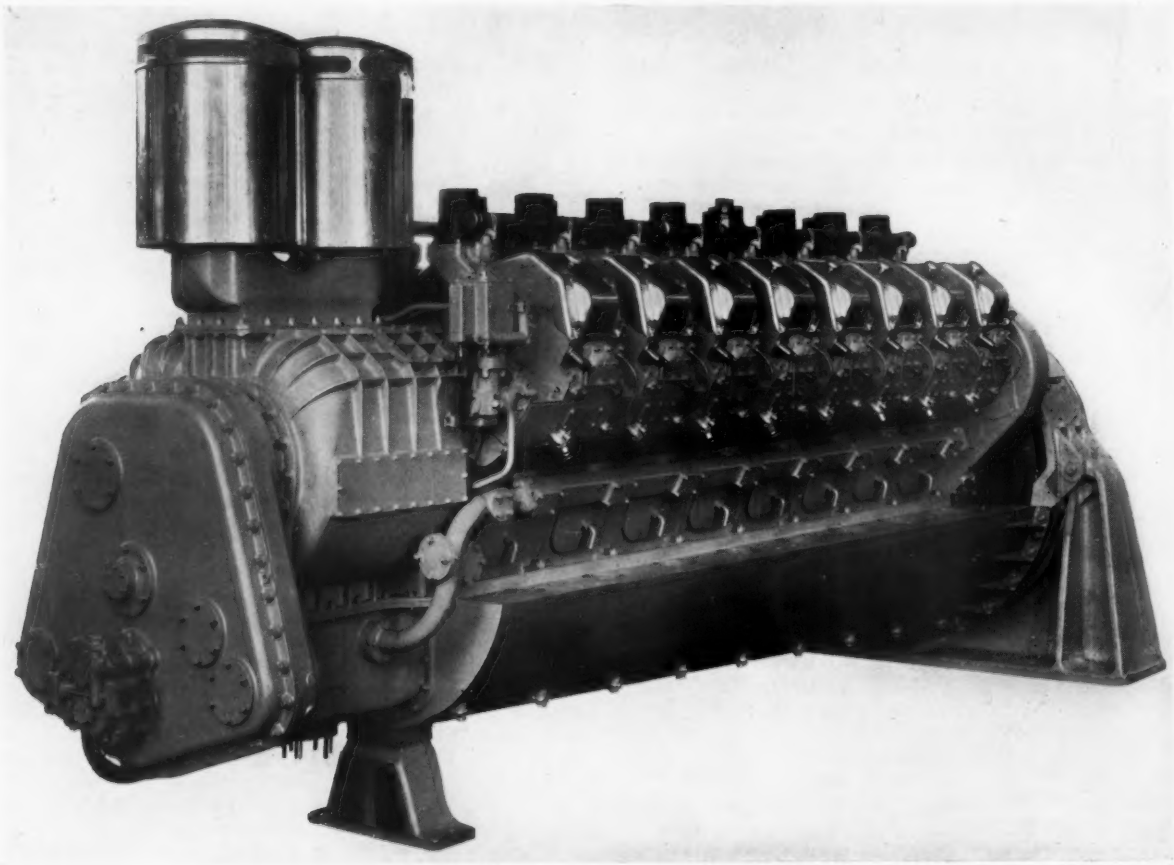
for any cracks and leaks. The exhaust valves and valve guides are cleaned so that all parts are in good working condition. All of the valve and injector rocker arm assemblies, automatic slack adjusters, valve springs, &c., are carefully inspected for defects each day. The electrician inspects the main and auxiliary generators, traction motors, controls, air-conditioning and electrical equipment in general. Experience indicates that by a thoroughly trained maintenance personnel and systematic inspections the power units can be kept in good running condition for approximately 1,000,000 miles, after which the crankshaft should be reground and undersized bearings applied.

In the maintenance of crankshafts, bearings, and connecting rods a careful daily record is kept of the lubricating oil pressure for each engine. When the pressure drops to about 22 lb. per sq. in. the maintenance forces begin to look for loose and worn bearings, and after these have been taken up the pressure rises again to the normal 35-40 lb. As an indication of the crankshaft wear, experience with the original Zephyr may be quoted. After running 462,000 miles, the crankpins had worn only 0·003 in. out of the round, and the total reduction of diameter of the crankpins averaged only 0·0015 in. The main bearings were less than 0·002 in. out of round, and the total reduction from the original diameter of the main bearings averaged only 0·006 in. out of round, and in view of these figures it seems possible that a crankshaft might run 1,000,000 miles before regrinding.

The lubricating oil used is to the S.A.E. specification No. 50, and has the following characteristics: gravity A.P.I at 60° F., 27°; flash point 470° F.; S.U. viscosity at 210 deg., 85. The oil is changed approximately every 5,000 miles, but a few gallons of make-up are added as required. The used oil or crankcase drainings are reclaimed in a Gustin-Bacon machine at an average cost of 11 cents. a U.S. gal., and are then used over again. Approximately 80 per cent. of the crankcase drainings are reclaimed, so the oil is as good as new, if not better.

Two important phases in the current maintenance are the power truck wheels and traction motors. The power truck wheels are skimmed up the tread after 49,000 miles of service; the traction motors are removed for bearing and other inspection every 130,000 to 150,000 miles run. In order easily to maintain a continuity of service an emergency power truck complete with motors, air brake equipment, &c., is on hand at the Chicago terminal for ready application to the two Denver and two Twin Cities Zephyrs. It may be well to mention that the type 716 G.E. traction motors are used in all Burlington Zephyr power trucks; the trucks in the four smaller three- and four-car Zephyrs are of necessity lighter, and therefore are not interchangeable with the power trucks in the four larger trains. In order to maintain a continuity of service with the smaller Zephyrs, an emergency traction motor is on hand at Houston, St. Louis and Lincoln, at which points facilities are available for changing the traction motors and wheels during the lay-over period.

Several failures have been experienced on the Denver runs. In one case the traction motor bearing ran hot; in another the water pump impeller key broke, allowing the engine to become overheated. In another instance,



Winton two-stroke 16-cylinder vee engine developing 1,200 b.h.p. at 750 r.p.m.

One of the two 3,000 b.h.p. stainless steel Denver Zephyr diesel-electric trains of the Chicago, Burlington & Quincy Railroad. The complete train is comprised of twelve cars, of which the front two are power cars. The leading power car has two 12-cylinder vee 900 b.h.p. engines and the second power car has one 16-cylinder vee 1,200 b.h.p. engine. Sleeping and dining accommodation is included in the train make-up

an object lying in the westbound track was picked up (evidently by suction) and punctured the fuel tank. Several failures have also been experienced on the Twin Cities Zephyrs, and steam locomotives had to be used. One failure was caused by a small leak in the air compressor cylinder head gasket which allowed air to pass into the water cooling system, causing an air-lock, hence overheating of the engine. In another case the flexible steel coupling between engine and main generator became defective, making it necessary to use a steam locomotive while repairs were being carried out. Once in a while a fuel injector or some other part becomes defective *en route*, but such troubles are of a minor nature. On several occasions in Denver it was found that all of the necessary work could not be done in time, so the train was allowed to depart with one power unit inoperative. Workmen completed the repairs *en route* before arrival at Brush, Colo., 88 miles out of Denver.

General Service Data

The performance of the generators, traction motors, controls and electrical equipment of the Zephyr trains in general has proved very satisfactory, with the exception that during the first year of the original Zephyr train service a disturbing amount of trouble developed in the S.K.F. traction motor armature shaft bearings. After considerable research it was found that the pinion and gear contact at high speed generated a sufficient amount of heat to melt the grease in the roller bearing housing which, augmented by the centrifugal force, would soon destroy the lubrication and then cause bearings to fail. The trouble was corrected by drilling six 1 in. holes in the pinion end side bearing plate for necessary ventilation.

SAM HOUSTON ZEPHYR TIMETABLE

Southbound Miles	Southbound Time		Northbound Time	Northbound Miles
0	6.00 dep.	Fort Worth	arr. 12.55	283
33	6.45 arr.	Dallas	dep. 12.10	—
—	7.00 dep.	Dallas	arr. 12.05	250
283	11.10 arr.	Houston	dep. 7.55	0

DENVER ZEPHYR TIMETABLE

Westbound Miles	Westbound Time p.m.		Eastbound Time a.m.	Eastbound Miles
0	5.30 dep.	Chicago	arr. 8.40	1,034
38	6.04 arr.	Aurora	—	—
162	7.40 arr.	Galesburg	dep. 6.23	—
—	7.42 dep.	,, ...	arr. 6.21	872
206	8.21 arr.	Burlington	dep. 5.41	—
—	8.24 dep.	,, ...	arr. 5.38	828
280	9.30 arr.	Ottumwa	dep. 4.30	—
—	9.32 dep.	,, ...	arr. 4.28	754
393	11.20 arr.	Creston	dep. 2.36	—
—	11.22 dep.	,, ...	arr. 2.34	641
492	12.56 arr.	Council Bluffs ..	—	—
—	1.04 dep.	,,	—	
496	1.15 arr.	Omaha	dep. 12.49	—
—	1.20 dep.	,, ...	arr. 12.45	538
551	2.15 arr.	Lincoln	dep. 11.48	—
—	2.23 dep.	,, ...	arr. 11.41	483
648	3.48 arr.	Hastings	dep. 10.22	—
—	3.49 dep.	,, ...	arr. 10.21	386
779	5.38 arr.	McCook	dep. 8.30	—
—	4.40 dep. (mountain time)	,, ...	arr. 7.28 (mountain time)	255
1,034	8.30 arr. a.m.	Denver	dep. 4.00 p.m.	0

From that time on no further roller bearing failures have been reported. Traction motors play a very important part in the performance of high-speed diesel-powered trains, so in order to assure against any possible road failures the motors are removed every 150,000 miles for general inspection and reconditioning.

Over a period of 16 months with the two 600 b.h.p. three-car Twin Zephyrs while working the Chicago—Minneapolis service, the operating cost averaged $0·3761 (18·6d.) a mile, made up as shown in the accompanying table. The miscellaneous items include interest at 5 per cent., depreciation at 4 per cent., and taxes at 1 per cent.; the capital cost of these three-car Zephyrs was $258,000 (£53,000) each.

OZARK STATE ZEPHYR TIMETABLE

Westbound Miles	Time a.m.		Eastbound Time	Miles
0	8.30 dep.	St. Louis	arr. 9.30	279
117	d	Mexico	d	162
131	d	Centralia	d	148
195	d	Marshall	d	84
225	d	Higginsville	d	56
269	d	Independence ..	—	10
279	2.00	Kansas City ..	4.00	0

d = flagstops

TWIN ZEPHYRS TIMETABLE

Miles	Time	Time		Time	Time	Miles
	a.m.	p.m.				
0	8.00	4 00	dep. Chicago .. arr.	3.00	10.59	441
38	8.34	4.34	dep. Aurora .. dep.	2.21	10.20	403
145	10.08	6.08	arr. Savanna .. dep.	12.42	8.42	—
—	10.09	6.09	dep. ,, .. arr.	12.41	8.41	296
185	10.46	6.46	dep. E. Dubuque dep.	12.05	8.05	256
298	12.23	8.23	dep. La Crosse .. arr.	10.28	6.28	143
—	12.53	8.53	dep. Miner, Wis. arr.	9.58	5.58	—
328	1.00	9.00	arr. Winona, Minn.*	—	—	—
—	12.40	8.40	dep. ,, arr.	10.10	6.10	113
431	2.30	10.29	arr. St. Paul .. dep.	8.30	4.30	10
441	3.00	10.59	arr. Minneapolis dep.	8.00	4.30	0
				a.m.	p.m.	

* on branch line

	Cents per train-mile
Maintenance of power and transmission plant	2·34
Maintenance of train	3·47
Fuel costs	1·29
Lubrication	0·69
Wages of crew	18·89
Supplies and other direct expenses	2·20
	28·88
Financial and other items (see text)	8·73
Total	37·61

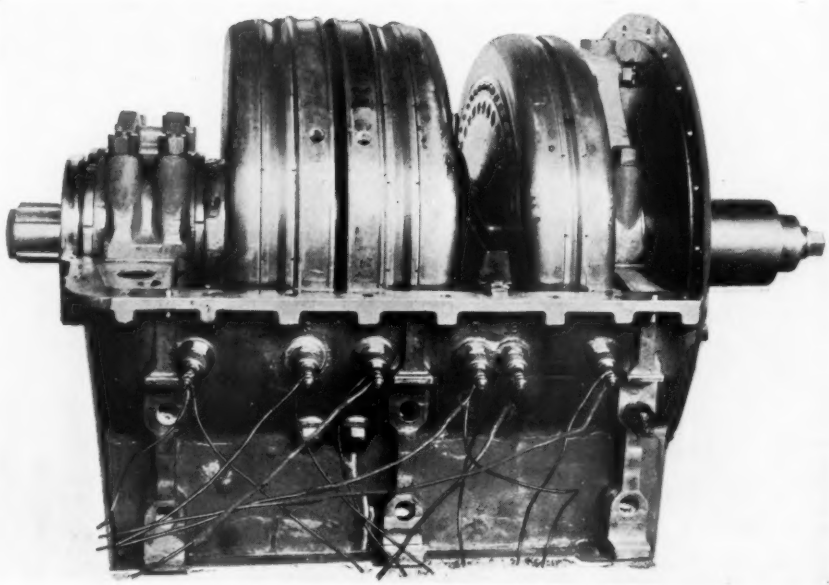
At the time of the performance given in the table, the maker of the trains was under contract to replace certain classes of material and parts free of charge, and assuming that the railroad was handling the complete maintenance and replacements, it is estimated that the cost would be increased by about 4½ cents per train mile.

The general average fuel consumptions of the three types of trains on their present duties are, for the main power plant only, 0·336 U.S. gal. per train-mile for the 660 b.h.p. trains; 0·90 U.S. gal. for the 1,800 b.h.p. trains; and 1·5 U.S. gal. for the 3,000 b.h.p. trains. The consumption of the auxiliary sets is 0·034 U.S. gal. per train-mile for the 660 b.h.p. trains; 0·12 U.S. gal. for the 1,800 b.h.p. trains; and 0·18 U.S. gal. for the 3,000 b.h.p. Denver Zephyrs. Including heating, auxiliaries, and traction, the consumption for a Chicago—Denver—Chicago round trip of 2,073 miles amounts to 26,400 lb., or about 3,125 imperial gal., or 1·5 gal. per mile total. During a round trip the evaporation loss in the engine cooling system of the 3,000 b.h.p. locomotive is scarcely 8½ imperial gal. in the summer and practically nil in the winter.

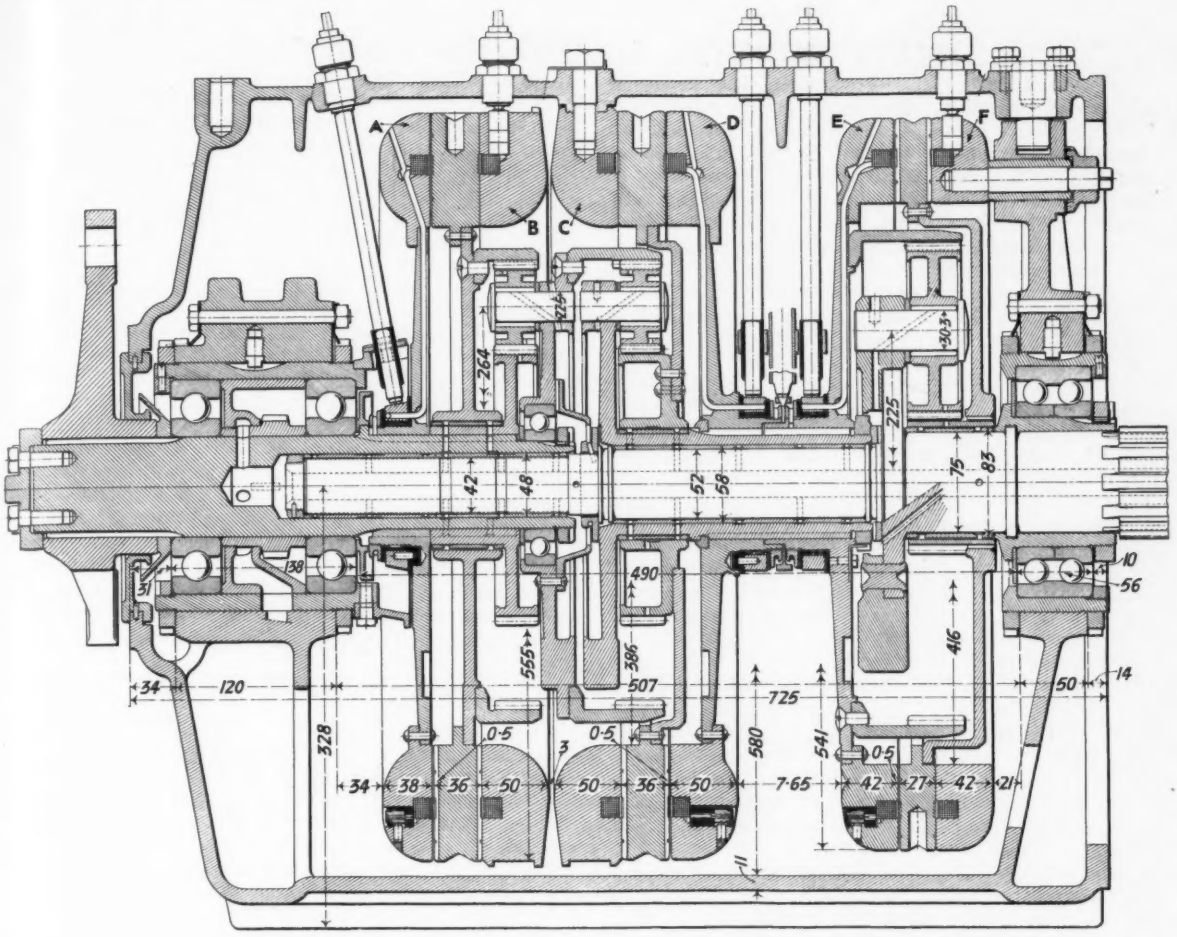
A HIGH POWER ELECTRO-MAGNETIC GEARBOX

LAST year one of the twin-engined triple-unit Fiat diesel-mechanical trains of the Italian State Railways (see issue of this Supplement for November 27, 1936) was fitted with Cotal electro-magnetic gearboxes, and the application represents a distinct advance in power for this type of change-speed mechanism, and is, indeed, well up to the maximum output of any type of railcar gearbox.

The feature of the Cotal system as a whole, in addition to the use of electro-magnetic gear-step clutches to bring into use the hypocycloidal trains of wheels, is that whatever gear step be engaged all of the moving components are in use, and thus a reduction in size and weight is obtained. The principle of the Cotal box was illustrated and described in the issue of this Supplement for



Cotal 450 b.h.p. eight-speed gearbox



Section through 450 h.p. Cotal electro-magnetic gearbox as used in Italy

COTAL EIGHT-SPEED GEARBOX

Speed	Sequence of electro-magnetic clutches	Speed, as proportion of top value	Torque, as proportion of the full speed value
1	BCF	0·184	5·44
2	BCE	0·236	4·23
3	BDF	0·297	3·37
4	BDE	0·380	2·63
5	ACF	0·484	2·06
6	ACE	0·620	1·61
7	ADF	0·780	1·28
8	ADE	1·000	1·00

January 25, 1935, and also in the issue of October 4, 1935. Apart from the capacity, the boxes sent to Italy incorporate another advance in that they provide eight speeds, covering the full range from starting up to the nominal maximum speed of 100 m.p.h. for which the Italian trains were designed. Each box is mounted in a bogie along with a Fiat 12-cylinder vee engine set to give a normal output of 450 b.h.p. at 1,500 r.p.m. and having a maximum capacity of 550 b.h.p. at 1,800 r.p.m. The box is capable of transmitting torques up to 210 m.kg. and weighs 740 kg. (1,630 lb.). This weight is with a bronze gearbox casing, and if light metal were used the weight would fall to about 640 kg. (1,420 lb.). These boxes are shorter and of generally smaller bulk than the four-speed ordinary type boxes which they superseded.

Power for the operation of the electro-magnetic clutches, which incidentally can prevent torque overloading in the box, is taken from the 36-volt auxiliary train-supply.

There is another model of the Cotal electro-magnetic gearbox, for 275 b.h.p. engines, which is much used in France. There are more than 60 of these four-speed sets installed in Michelin pneumatic-tyred railcars, each with a transmission capacity up to 125 m.kg. The four ratios are 4·22, 2·59, 1·62 and 1·0 to 1, and the box is used in conjunction with a fluid flywheel. With the Vulcan-Sinclair type of constant-filling fluid coupling the momentary softness of the coupling at the instant of torque reversal can be used to cushion the torque variation within the box. By effecting the gear change during the instant that the vortex ring inside the coupling has collapsed, the requisite electro-magnetic clutches can take up the drive with very little slip, whereas an instant later, when the clutch is fully engaged, the vortex action of the fluid in the coupling is re-established, and the transmission of power is again practically positive.

SOUTH AMERICAN RAILCAR ADVANCE.—Based on experience obtained with trial units during the past few years on the Buenos Ayres & Pacific Railway, Mr. Ryan, the General Manager, has advanced the opinion that the passenger and parcels traffic of that line could be advantageously operated almost entirely by railcars equipped with multiple-unit control.

HEAVY SHUNTING LOCOMOTIVE OPERATION

VALUABLE operating data, based on the experience obtained with many of the numerous diesel-electric shunting locomotives in the U.S.A. is presented in a paper entitled " Some Data on Diesel-Electric Switching Locomotives " read by Mr. John W. Anderson before the American Society of Mechanical Engineers. At the end of 1936 there were 225 diesel-electric switching locomotives with an aggregate b.h.p. of 107,000 in the U.S.A., and these figures have been increased considerably within the last 15 months.

Availability

The availability of the locomotive in service is important. While the figures in individual cases vary somewhat due to local conditions or perhaps to an unusual amount of trouble with some individual locomotive, the average figures based upon a number of switchers and over a period of years are impressive. One railroad with many years' experience with a large number of switchers reports an average of 86 to 87 per cent. as a past record, and is hopeful of getting better than 90 per cent. in the future, because it considers that early troubles have been eliminated and the operating and maintenance practices are now improved so that such figures are obtainable.

Another group of six locomotives, some of which have been in service for several years, recently showed availabilities of 88, 51, 81, 93, 95, and 91 per cent. respectively, or an average of 83·2 per cent. in spite of the poor showing made by one of them. This poor showing was caused by a single electrical failure with a loss of 52·75 days and four engine failures with a total loss of 35·5 days, all during a calendar period of six months. The figure for a third group, totalling 461,965 locomotive hours, was an availability of 81·76 per cent.

A fourth group of six locomotives in service from 1930 to 1936, inclusive, gave the yearly availabilities of 88·3, 82·1, 83·8, 84·5, 82·1, 85·9, and 88·9 per cent. respectively. The improvement in the showing with time bears out the experience of others. As the defects in these locomotives were found and corrected, and as the personnel became better acquainted with the switchers, the reliability record improved. Further, the time not available is frequently increased by waiting for mechanics to do the work. These switchers must take their individual turn in the enginehouse, and when men and perhaps materials are not available for prompt repairs, then the availability record suffers accordingly. This same railroad placed eight additional switchers in service in 1935. During the last half of that year they had an availability of 97·2 per cent., while in the entire year of 1936 they had an average availability of 95·6 per cent. These figures are a direct reflection of more modern design based upon earlier experience and of better-trained operating personnel.

It appears that an availability from 80 to 85 per cent. is readily obtainable, and a figure of better than 90 per cent. is feasible. In this connection it should be realised that as far as the railroads are concerned, the Interstate Commerce Commission requires certain routine inspections that require 0·5 hr. daily, and a total of 520·5 hr. yearly, which represents 5·94 per cent. of a year's availability. Allowing further one month for general overhaul every four years, or an additional 2 per cent. per year, then an availability figure of about 92 per cent. is the highest possible over a period of years without allowance for failures or extra repairs of any kind.

It is interesting to approach the subject of availability from the standpoint of service failures, their causes and their frequency. The chief causes for mechanical failures in the past have been such items as piston seizures due to lack of lubricating oil for the wrist-pin bearings; lubrication failures at the main bearings because of poor fitting or failure of the lubricating-oil pump; circumventing the safety device on the lubricating-oil system; failure of the air pressure in the safety-device reservoir; leaking cylinder heads; broken cylinder liners; failure of connecting-rod bearings; cracked cylinder heads; sticking and broken valves; broken pipes; and leaking gaskets. Some of the causes of electrical failures have been occasional burned-out motor-armature bearings; burned-out main-generator bearings due to improper lubrication; grounded commutating field coils due to improper cleaning and design; voltage-regulator failures due to improper design; and blown fuses.

It is particularly emphasised by the mechanical departments of these railroads that the majority of these causes of failures were due to the faults in the original design and to lack of experience on the part of the operating personnel. Practically all of the design defects have since been corrected and the personnel has gained experience, so that the later records of reliability have improved over the earlier figures.

Working Costs

Such items as fuel and wages vary in proportion to the hours of use. But for such an item as repairs, there is a time as well as a use factor. As a matter of fact, an important portion of the normal expense for repairs of a switcher (30 to 35 cents per hour of use) is due to routine inspection and maintenance. Some locomotive items need repairing on a time basis rather than a use basis; hence, the cost of repairs expressed in cents per hour of use reduces as the yearly hours of use increase. It appears that a total repair cost of 35 to 40 cents per hr. of use is attainable under favourable conditions. The latter include well-designed switchers, trained operating personnel, and use on at least a two-shift-per-day basis.

Operating and repair costs for steam switchers vary considerably, as do corresponding costs for diesel switchers; also the individual items vary according to the size and power of the switcher. However, in the accompanying table are given some comparative operating and repair costs which are representative of those for an 0-8-0 steam switcher, a 600 b.h.p. diesel switcher, and a 900 b.h.p. diesel switcher; the costs for the steam switcher are average for a coal-fired locomotive operating in eastern territory. The 0-8-0 steam switcher will use from 600 to 800 lb. of coal per hr. according to whether it is doing the work of a 600 b.h.p. or a 900 b.h.p. diesel switcher. The fuel cost of $1.20 corresponds to a firing rate of 600 lb. per hr. of coal which costs $4 per ton, or a firing rate of 800 lb. per hr. of coal which costs $3 per ton. The fuel costs for the diesel switchers are based on a fuel-oil cost of about 5 cents per gallon. Wages include two men per locomotive; the fireman on the steam switcher receives a slightly higher wage than the helper on the diesel. Repair costs are taken at conservative figures.

Economy Figures

In comparing the figures given in the table it is obvious that the three important items are fuel, enginemen's wages, and repairs; and in the case of two of the three items the steam switcher costs are much higher than those for the diesel switchers. The diesel switcher offers a saving of from $1.45 to $1.65 per hr. of use, and the total saving per year amounts to an impressive figure. Except for legal restrictions, it is feasible to operate these diesel

COMPARATIVE STEAM- AND DIESEL ENGINE-SWITCHER OPERATING COSTS PER HOUR OF LOCOMOTIVE USE.

	0-8-0 Steam Switcher*	600 b.h.p. Diesel	900 b.h.p. Diesel
Fuel	1·20	0·28	0·37
Water	0·04	—	—
Lubricating oil	0·03	0·05	0·05
Enginehouse expense	0·30	0·07	0·07
Supplies	0·02	0·02	0·02
Wages	1·65	1·63	1·63
Repairs	0·90 to 1·00	0·40 to 0·60	0·50 to 0·70
Totals	$4·14 to 4·24	$2·45 to 2·65	$2·64 to 2·84

* Coal-fired

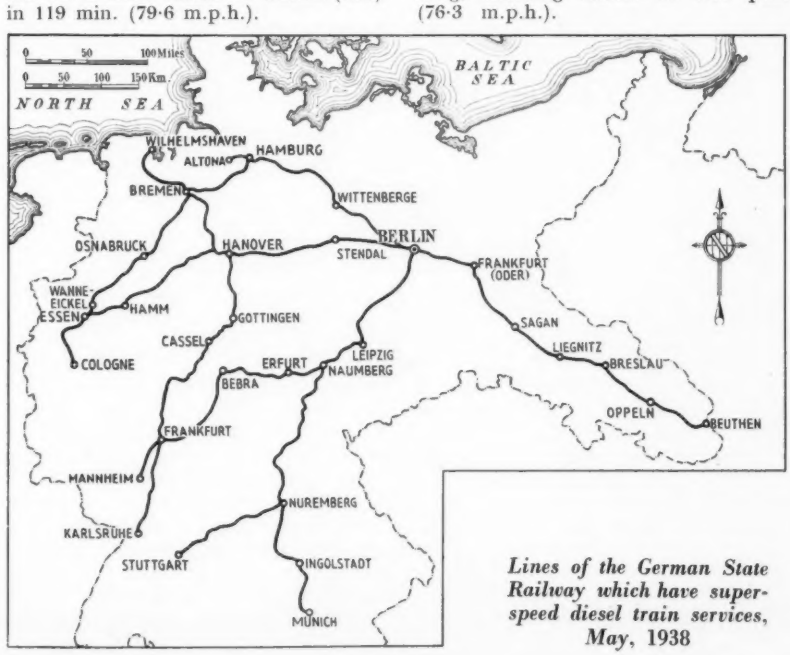
switchers with one man. Then the cost of operation becomes about $1.80 per hr. for the 600 b.h.p. unit and $2 per hr. for the 900 b.h.p. unit. This is a clear saving, not counterbalanced by other items. For instance, where there is a group of locomotives working, the higher availability of the diesel permits greater use. Experience has proved that an availability of 66 per cent. for the steam switcher corresponds to 93 or 94 per cent. availability for the diesel, that is seven steam switchers are needed to do the work of five diesels. Comparative first costs are $50,000 per steam switcher and $70,000 for the 600 b.h.p. diesel switcher. Thus, the overall first cost for the group is the same in both cases. If the use of individual locomotives is compared, the operating savings quickly wipe out the difference in first cost.

MORE BRAZILIAN DIESELS.—The five twin-car diesel-mechanical trains ordered by the Central Railway of Brazil from Fiat have now been delivered. Originally, it was intended that these trains should be formed of two close-coupled separate railcars, but articulation has been adopted in the final design. The construction in general follows that of the Fiat standard Littorina railcars, and is of the all-steel all-welded type, and within an overall length of 99 ft. has over 60 seats, a bar, and refrigerating equipment. There are also three lavatories and ample luggage space. A form of air-conditioning, with electrically-driven equipment below the underframe, is applied to the passenger saloons. At each end of the train is mounted on the bogie a Fiat standard six-cylinder 145-b.h.p. oil engine and a Fiat gearbox and mechanical transmission giving a maximum speed of 55 m.p.h. Speeds of 30 to 33 m.p.h. can be maintained up 1 in 55 grades. These diesel trains are to be used on luxury services between Rio de Janeiro and San Paulo, and from Rio to Bello Horizonte, on schedules which will effect a 30 per cent. saving on the present steam train times.

German Summer Train Services

Important additions to and improvements of the main line train services in Germany will become operative with the introduction of the 1938-39 timetables on May 15. Additionally to the six high-speed diesel services at present at work on the Berlin—Cologne, Berlin — Hamburg — Altona, Berlin—Frankfort, Berlin—Munich and Stuttgart, Berlin—Breslau—Beuthen, and Cologne—Hamburg routes, three new services are to be introduced. One, by a cross-country route, will connect Karlsruhe with Hamburg *via* Heidelberg, Darmstadt, Frankfort, Kassel, and Hanover, leaving Karlsruhe at 6.25 a.m., and reaching Hamburg at 1.47 and Altona at 2.2 p.m. The return journey is begun at 5.45 p.m. from Altona and 6 p.m. from Hamburg, Karlsruhe being reached at 1.20 a.m. The fastest previous time over this 429-mile route has been 10 hr. 6 min., which will be cut to 7 hr. 22 min. northbound and 7 hr. 20 min. southbound between Karlsruhe and Hamburg by the new service. The fastest point-to-point run will be Hamburg to Hanover, 112¾ miles, in 90 min. (75·2 m.p.h.). Connecting with these trains at Frankfort in each direction will be the existing diesel-electric service between Berlin and Frankfort, which is extended to serve Mannheim, so putting Mannheim also into direct connection with North Germany. A second new diesel service is to operate between Berlin, Hanover, Bremen, and Wilhelmshaven. This will leave Wilhelmshaven at 5.48 a.m. and Bremen at 7.15 a.m., reaching Berlin (Zoo) at 10.19 a.m., and continuing to the Schlesischer station; return in the evening is at 4.38 p.m. from the latter and 5.2 p.m. from Zoo, reaching Bremen at 8.26 p.m., and connecting at Hanover with the Hamburg—Karlsruhe train, which gives a fast evening service from Berlin to Göttingen and Kassel. On the outward journey this unit spends 1½ hr. at Bremen before proceeding to Wilhelmshaven. This route between Berlin and Bremen is 24½ miles longer than the direct route *via* Uelzen, but the overall times of 3 hr. 4 min. eastbound and 3 hr. 24 min. for the 233·8 miles *via* Hanover are, of course, far faster than any existing service. Eastbound, the new unit will cover the 76 miles from Bremen to Hanover in 63 min. (72·4 m.p.h.) and the 157·8 miles thence to Berlin (Zoo) in 119 min. (79·6 m.p.h.).

The third new high-speed unit forms part of an extensive reorganisation and improvement of the Berlin—Hamburg service. It will leave Berlin Lehrter at 2.16 p.m., reaching Hamburg (178·1 miles) at 4.41 p.m. (73·7 m.p.h.) and Altona at 5.3 p.m.; the return, at 9.11 p.m. from Altona and 9.30 p.m. from Hamburg, will provide a new late evening service to Berlin, arriving at 11.58 p.m. (72·2 m.p.h.). The Flying Hamburger is to forsake its time-honoured 11 a.m. departure from Berlin for one at 6.56 a.m., reaching Hamburg at 9.29 a.m. (69·8 m.p.h. and 16 min. slower than now), while the return will be at 10.50 a.m. from Hamburg, reaching Berlin at 1.10 p.m. (76·3 m.p.h.).



Lines of the German State Railway which have super-speed diesel train services, May, 1938

NOTES AND NEWS

Mylius Gearboxes.—The number of Mylius mechanical transmissions now in operation on, or under construction for, railcars and small locomotives is over 830.

Hydraulic Transmission and Couplings.—A total of 542 Voith torque converters and 948 Vulcan-Sinclair fluid couplings aggregating 262,764 h.p., are now in operation in traction service, and many others are on order.

New Saurer Engine.—The Adolphe Saurer S.A., of Arbon, Switzerland, has evolved an eight-cylinder vee engine developing 140 b.h.p. at 2,000 r.p.m. The cylinders are 110 mm. by 140 mm. and the weight is about 12½ lb. per b.h.p. A Bosch fuel pump is incorporated and also the usual Saurer dual-turbulence cylinder head.

German Diesel Trains.—According to recent statistics the super-speed diesel trains of the German State Railway covered in 1933 a total mileage of 65,000 (1); in 1934, 100,000 (1); in 1935, 420,000 (13); in 1936, 1,440,000 (18); and in 1937, 1,900,000 (18). The figures in brackets are the number of trains in service at the end of each particular year.

Small Australian Diesel Locomotives.—Rasch Motors Proprietary Limited, of Adelaide and Melbourne, have made arrangements with Gibb & Miller Limited, of Port Adelaide, to construct diesel locomotives of 63, 78 and 94 b.h.p., which are to be powered by Gardner oil engines and fitted with Vulcan-Sinclair fluid couplings and Wilson epicyclic gearboxes.

Railcar Windows.—The half-drop and full-drop windows for the 108 Drewry diesel railcars for Argentina, described in detail in our issue of March 18, were supplied by Messrs. Hallam, Sleigh & Cheston, of Birmingham, who thus effected delivery of what is probably the largest order for railcar windows ever placed. The half-drop windows are of the maker's Aero type and the full-drop windows are of the Atlas pattern.

American Diesel Locomotive Lease.—The Federal District Court at Chicago has authorised the Chicago, Rock Island & Pacific Railroad to enter into an agreement with the Electro-Motive Corporation to lease eight 89-ton 600 b.h.p. and two 112-ton 900 b.h.p. diesel-electric switching locomotives for a period of seven years, with an option to purchase. The gross rental for each of the 600 b.h.p. locomotives will be $67,500 and for the 900 b.h.p. units, $88,000 each. A similar arrangement was made last year between the same parties, and in the present application the railroad stated that after the payment of the rental, $1,000 a month was being saved by the ten diesel locomotives concerned.

LETTER TO THE EDITOR

Railcar Services in France and England

56, St. Mary's Mansions, Paddington, W.2
April 27, 1938

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Your reference to the remarks of Mr. W. A. Stanier on the "philandering" attitude of British railways to the railcar (in my opinion a generous estimate of the position, seeing that the preliminary introductions have scarcely been made!) came to my notice at a singularly opportune time, for I happened to be travelling on what is now the Région du Sud-Est in France, between Lyons and Grenoble. The train-service in this area has been so transformed by the use of railcars (though, as your readers well know, the case is by no means unique in France) that it may be interesting to compare the present facilities, very briefly, with those of four years ago. In the spring of 1934, there were eleven services daily between Lyons and Grenoble—nine by steam-trains and two by railcars—with an average journey time (in both directions) of 2 hr. 20 min.; today there are 22 daily services—eight by steam-trains and fourteen by railcars—with an average journey time of 2 hr. 7 min. The distance is approximately 70 miles, and the fastest railcar, with six intermediate stops, takes 108 min.; in 1934 the best railcar schedule was 107 min., and the time occupied by the steam-trains has not materially altered. It must be granted that there are areas in England where the occupation of the line would not readily admit of so great an increase in the number of passenger trains, and that there is often overcrowding of railcars in France to a degree which might not be welcomed here, but there are plenty of secondary lines in Great Britain, not suitable for really high speeds and non-stop runs, which may fairly be compared with the Lyons—Grenoble route.

As the L.M.S.R. diesel-train is to be used on the Oxford—Bletchley—Cambridge run, it may be well to recall the fast steam-schedules operated by the L.N.W.R. in March, 1905, between the two university towns. These trains occupied 43 or 45 min. over the 31¼ miles between Oxford and Bletchley, with one intermediate stop, at Bicester. On the Bletchley—Cambridge line, they were stopping trains east of Bedford, and took, for the 45¾ miles, 78 min. with seven, or 85 min. with ten, intermediate stops, but waits of 20 or 25 min. at Bletchley (for necessary connections into and out of main-line trains) caused the all-over schedule, for 77 miles, to vary from 145 to 170 min. As you have pointed out, it is still impossible to neglect the intermediate towns and villages in this sparsely-populated area, and the diesel-train should be able to cut the old Cambridge and Bletchley time very greatly, with an equal number of stops. But surely these possibilities could have been explored, years ago, on the principle of the "accelerated trains" in France and Belgium—to which, also, you referred—for experience seems to me to point to the conclusion that, unless a branch-service can be taken over entirely by railcars, the proper function of these vehicles is the building-up of a longer-distance main-line traffic, where speed and stops are essential, but where the numbers travelling do not justify a steam train. The Great Western's Birmingham and Cardiff service is still practically the only instance of such an experiment in Great Britain.

Yours, &c.

R. E. CHARLEWOOD

[While there can be no two opinions that it is far more economical to turn a branch line or other section over to diesel railcars entirely rather than partially, great economies or very much improved facilities can frequently result from the partial use of railcars. The ability of the railcar to produce net revenue extends to practically every type of service, but the actual performance depends largely upon just what object the railway wishes to attain when introducing the car.—ED.]